ANUS · RECTUM
SIGMOID COLON

Diagnosis and Treatment

VOLUME ONE

ANUS, RECTUM SIGMOID COLON

Diagnosis and Treatment

BY

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Third Edition

In Two Volumes

VOLUME I



Philadelphia London Montreal

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PLATE 1



Extensive inflammatory stricture of the rectum and entire left colon Left hemicolectomy and procto sigmoidectomy performed without colostomy trans verse colon transplanted to anal aperture external and internal sphincters preserved

To the Memory of
My Father

H. AUGUSTUS BACON

LATE PROFESSOR OF OPERATIVE SURGERY
TEMPLE UNIVERSITY MEDICAL SCHOOL

THIRD EDITION

SECOND IMPRESSION

PRINTED IN THE UNITED STATES OF AMERICA

Preface to the Third Edition

The reception accorded earlier editions of this treatise with reprintings on several occasions and translations into both Spanish and Portuguese has been particularly gratifying. So much new and important material has eventuated during and as a result of the late war period that a new edition is deemed timely.

Where a treatise is based exclusively on the personal experiences of an author, the scope of ideas presented tends to contract as does the range of therapeutic measures advocated; this may not always serve the purpose of the vast majority of those seeking information in connection with their individual problems. Then, too, the knowledge gained through the experiences of any one author is ordinarily not well distributed among the many affections and diseases inherent in this portion of the bowel. By the same token, a publication definitely of the encyclopedic type may leave the reader in a mire of confusion, conjecture and even misinterpretation of the author's ideas.

In preparing this edition all material has been revised and brought up to date. The detailed presentation of congenital anomalies is based on a fair series of personal cases. The newer concepts pertinent to megacolon and megarectum have been discussed along with the results achieved by the use of various procedures. The management of the more complex fistulae, such as those of the recto-urethral, rectovesical, rectovaginal, rectosigmoidal, abdominorectal and ano-inguinal varieties, has been evaluated. Pruritus ani need be no longer the distressing and discouraging problem of yesteryear because the disease has been approached in the light of a biochemophysiologic imbalance. However, the final solution to this troublesome syndrome has not yet been determined; for this reason various forms of accepted and experimental therapy are aptly included in the discussion.

One should be ever mindful that sound judgment and meticulous attention to technic always must remain the basic requirement for efficient surgery. However, experience has taught that correction and maintenance of physiologic equilibrium (nitrogen, fluid, acid-base, caloric, vitamin balance), improved methods of anesthesia administration and its supplementary measures, as well as the management of complications, particularly phlebothrombosis, pulmonary atelectasis and intestinal obstruction, have placed surgical achievement on an unprecedentedly high plane. Contrary to the usual custom, pertinent phases in the preoperative preparation and the postoperative treatment of patients undergoing resection are considered in detail. Various sulfonamides, both absorbable and particularly the nonabsorbable, are evaluated in relation to their employment. The antibiotics, penicillin and streptomycin, both being used extensively, are also discussed.

Special reference has been made to the surgical management of procidentia of the rectum and the sigmoid, the treatment of lymphogranulomatous stricture of venereal origin and technical refinements in the performance of various types of abdominal stomata.

On the Continent, particularly in France, Germany, Austria and Italy, operative procedures for malignancy of the lower bowel have been approached customarily in stages and without the formation of an abdominal colostomy. During the past decade there has arisen a tendency in this country to revive these heretofore discarded procedures; as a result much criticism has been invoked. A personal experience involving 800 patients with malignancy of the lower

source of inspiration Another former associate, Dr Clifford I Hardwick, now Chief of the Colon and Rectal service and Associate Professor of Surgery at the University of Oregon, did much in the preparation of the chapters on actinomycosis and volvulus of the sigmoid Dr Lola Pedlow and later Dr George D Broad, both serving as residents assiduously abstracted relevant material on benign tumors Dr Henry C Schneider, of our department, performed the difficult task of abstracting all worth while material on proctocolitis

With a splendid record in World War II, Dr Rowe was particularly qualified to incorporate his experiences in the chapter on the management of wounds and injuries to the rectum To Dr S Arthur Linde the writer is indebted for delving into the history of diverticulitis and its abstractions All case reports herein contained were prepared by our residents Dr Edwin R McKay and Dr A C Hering, both of whom deserve praise for this work Mention should be made also of our present residents Dr I I Sherman and Dr H D Trimpi Credit is given to my associate Dr George D Vaughan for his untiring efforts in reading proof which at its best, is a rather thankless assignment

It is seldom realized and certainly infrequently mentioned that the surgeon is a single individual and although the operation itself assumes a major role the management of the surgical patient begins with the day of admission to the hospital and ends with his or her discharge The burden of the preparation, the management of complications which may occur during the early morning and late hours of the day, is assumed usually by the resident staff Let it be said that the results achieved with regard to mortality and morbidity have been made possible through the untiring efforts of these talented young men herein mentioned who have already given promise of a brilliant future

To my secretaries, particularly Miss Irene Engard the author is profoundly indebted for their conscientious assistance Mr James Keegan rendered valuable service not only by rechecking compilations and statistics incorporated in this edition but also in arranging for translations, especially from the French German Russian and Scandinavian tongues

Mr Milford Diedrick, head of the Department of Medical Art at the University of Buffalo Medical School has prepared all new illustrations The drawings in color were made by Mr William B McNett Mr William Taylor, head of the photographic department at Temple University Hospital prepared all of the operative specimens

Finally the author wishes to thank the publishers the J B Lippincott Company for their co-operation in this project He also desires to acknowledge the courtesies of other publishers and authors who have granted permission to use certain materials as credited in the text

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Philadelphia

bowel during the eight year period ending September, 1948 has afforded an opportunity to investigate and evaluate the results, both immediate and remote, of methods used to eliminate an abdominal colostomy, particularly the procedure popularized by Babcock under the term "proctosigmoidectomy." In discussing abdominoperineal proctosigmoidectomy without colostomy and with preservation of the anal sphincter musculature, the author has earnestly desired to render a truthful and unbiased opinion based on a personal series of four hundred patients with cancer upon whom this operation was performed. This should enable the reader to judge the merits and the demerits of such a procedure and to reach his own conclusions. Toward this end an approach has been made to a detailed discussion of indications, contraindications, technic, comparative rates of mortality and morbidity, complications and sequelae peculiarly inherent to the procedure, anal sphincter continence, survival rates in terms of five year cure and incidence of local recurrence.

The author wishes to emphasize the fact that the operation par excellence for all lesions of the lower bowel has yet to be designed. Proctosigmoidectomy is by no means the final answer for cancer of the ampullary rectum and rectosigmoid, nor is sigmoidectomy itself the absolute dictum for growths below the peritoneal reflection. The popular Miles operation is sound pathologically but lacks the specific capability to effect complete removal of all nodal tissue in every instance as Wangensteen has aptly stated. Attention is called to the fact that the degree of radicality may depend less on the operation than upon the surgeon himself. Further experience has proved that no single operative technic is suitable for every patient with cancer of the lower bowel. We as surgeons err in committing that common surgical sin if we insist on adapting the patient to the operation rather than the procedure to the individual.

The original investigations of Drummond and Sunderman relevant to the arterial pattern of the left colon and the sigmoid have been evaluated. Particular reference has been made to a procedure which, although limited in applicability, we have found occasionally useful, namely, left hemicolectomy and abdominoperineal proctosigmoidectomy as a single stage maneuver, without colostomy and with preservation of the anal sphincters.

New chapters which have been added deal with actinomycosis, diverticulitis, volvulus, kraurosis, methods to alleviate intractible pain incident to inoperable cancer, and the use of alloy steel wire sutures.

Inasmuch as departments of anesthesiology composed of qualified physician anesthetists, are being incorporated into the curricula of many hospitals, the author requested Dr. Francis J. Audin, formerly professor and head of the department at Temple University, to rewrite the chapter on anesthesia, a task that he has performed in a highly satisfactory manner.

Impressed with the investigative work of Rhoades, Coller, Wangensteen, Pack and Elman in relation to fluid, nitrogen and acid base balance, our resident, Dr. Orville C. Gass, assumed the difficult task of incorporating these newer methods into our department. This plan was assiduously continued by subsequent residents including Dr. Otho P. Griffin and Dr. J. P. Fleming. Dr. Robert J. Rowe deserves particular mention, since by experimental study combined therapy, employing the nonabsorbable sulfonamides and streptomycin, was evolved. Exactly three years ago, when this third edition was undertaken, my associate Dr. Caleb H. Smith, now head of the Department of Surgery at Bradford General Hospital and Assistant Professor of Surgery at the University of Rochester, accepted the responsibility of selecting from the voluminous literature available that which would be of interest to the reader. In addition to this his suggestions and wise counsel have continued to be a constant

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HARRY E BACON

Philadelphia

Preface to the First Edition

Progress in the science and art of proctology has so developed during recent years that there would seem to be a distinct place for a text book which presents, in systematic form, all the necessary information, especially that required for practical purposes

The object of the author is to place within the reach of all divisions of the medical profession a comprehensive and readily intelligible exposition of our present knowledge of the various affections of the anus, rectum and sigmoid colon The volume was constructed with a twofold purpose in mind first to awaken a realization of the magnitude of this subject in itself and in its relation to general medicine and, second to set forth in convenient and instructive form an informative description of the diversified conditions included in proctologic practice Texts are ordinarily incomplete or vague as to details the lesser known procedures are ignored, and that most important point of all the close relationship of proctologic syndromes to the entire physical picture both in their effect on other existing pathology and vice versa is either misunderstood or insufficiently emphasized Certainly it is apparently not generally realized The importance of diseases of this portion of the intestinal canal is becoming increasingly evident however and the interests of both doctor and patient demand that their study be made as simple thorough and practical as possible

It is felt that the resulting volume which has consumed over seven years of constant notation elimination and construction based on private practice clinical experience in two of the largest proctologic departments in this city, and post graduate studies abroad, comprising a concentration of study and a wealth of material which transcend a mere time element, is sufficiently detailed to serve as a text for the student and as a reference book for the general practitioner instructing him in diagnosis and, as far as possible, treatment For the general surgeon it is informative on surgical procedures applicable to proctologic syndromes and he is urged to consider the importance of these syndromes which all too often are dismissed as inconsequential

Diagnosis in terms of the underlying pathology is emphasized throughout and the necessity for thorough examination stressed The correct method of proctoscopic and sigmoidoscopic examination is presented, distinguishing features in diagnosis are elucidated and listed in chart form for quick reference, all new and practical forms of treatment are discussed and evaluated according to results without prejudice of the author

Incorporated are much new material and investigative work, supported by published reports of the authors Classifications have been devised wherever possible, since subdivisions of a heading tend to clarify its component sections as well as bring out and emphasize details

An extensive bibliography has been prepared with the object of giving credit to the many pioneers in this branch of medicine to offer an easy means of reference and to open up further fields of thought and investigation

HARRY E BACON M D

Contents

VOLUME I

CHAPTER 1

Anatomic Considerations

ANATOMY

Anus

The anus is the oval aperture through which the anal canal communicates with the exterior (Fig 1) It appears as an anteroposterior slit situated in the midline slightly behind an imaginary line drawn between the two tubera ischii and between the perineal body in front and the coccyx behind The skin about the orifice or perianal region is usually darker in color than the surrounding integument and contains sudoriferous and sebaceous glands as well as the circumanal glands of Gay[39] (apocrine glands) and hair follicles The skin is thrown into folds by the corrugator cutis and external sphincter muscles Extending forward from the anus is the perineal raphe which is continuous with the central raphe of the scrotum, while behind a smooth ridge, the anal raphe extends from the posterior portion of the anus to the skin overlying the dorsum of the coccyx

Anal Canal

The anal canal is the terminal portion of the large intestine below the rectum It begins at the anorectal line, which is slightly below the level of the apex of the prostate in the male and of the perineal body in the female and ends at the anal orifice This

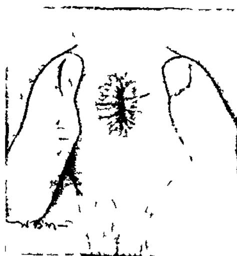


Fig 1 Appearance of normal anus

(Fig 2) They are covered by stratified squamous epithelium Frequently these papillae become inflamed or undergo hyper trophy and cause sphincter irritability At the upper end of the anal canal the strati fied squamous epithelium of the anal skin changes abruptly into typical columnar epithelium of the rectal mucosa This point of transition is the anorectal pectinate or dentate line and represents embryologi cally the line of junction between the entodermal cloaca and the proctodeum

The Pecten *The pecten, which extends from the anorectal line above to the inter sphincteric line below* apparently derives its importance from the contents of the subepithelial areolar tissue it circumscribes, namely the preformed anal ducts and intra muscular glands

Relations of the Anal Canal Encircling the anal canal are the external and internal sphincter muscles so that, posteriorly the canal is in relation with the external in ternal and levator ani muscles and the ano coccygeal gland Laterally the anal canal is in relation with the above named sphinc ters which together with the anal fascia separate it from the ischiorectal fossae Anteriorly in the male the canal is in rela tion with the membranous portion and bulb of the urethra, the fascia of the urogenital diaphragm, the superficial transverse peri neal muscles, the apex of the prostate, the anterior fibers of the levator ani muscle and perineal body, in the female, with the sphincter vaginae (bulbocavernosus) mus cle the posterior margin of the triangular ligament and the rectovaginal muscle which is a homologue of the recto-urethralis

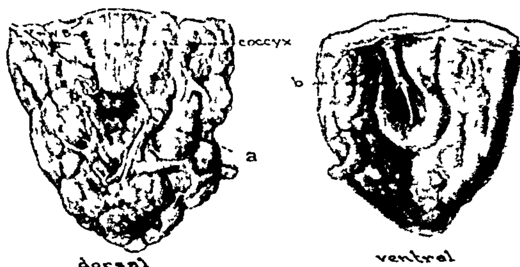


Fig 3 Region of tip of coccyx showing glomus (a) Glomus Coccygeus (b) Middle sacral artery (Reuther T F Illinois M J Feb 1938, p 134)

Anococcygeal Body

The anococcygeal body (*coccygeal body* or gland globus coccygeus or gland of Luschka) [6] is a small, pinkish grey or yellow, spherical mass approximately two mm in diameter It lies immediately below the tip of the coccyx and beneath the leva tor ani muscle which at its insertion into the central tendon and the coccyx forms a small aperture through which pass the small communicating branches of the middle sacral artery and the nerves to the glomus Below the glomus is the insertion of the anococcygeal ligament the fibers of which surround the structure and insert on the dorsal surface of the tip of the coccyx The ligament and the levator muscle join an terior to the glomus while the coccyx

canal which averages 1 2 inches (3 cm) in length and from 5 to 9 cm in circumference, is directed downward and backward and is invested by the internal sphincter and both the profunda and superficialis portions of the external sphincter It is supported by the levator ani and surrounded at the orifice by the external sphincter The anal canal is

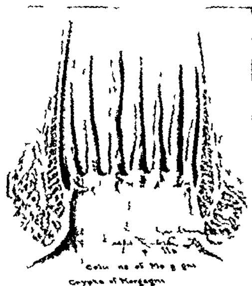


Fig 2 Coronal section of lower rectum and anus showing anal valves, valves or crypts of Morgagni (the columns of Morgagni somewhat accentuated), papillae, external and internal sphincter muscles

lined with modified skin is smooth and shiny in appearance and, although endowed with poor blood supply, is rich in sensory nerve terminals This modified skin is closely adherent to the underlying fibroelastic extension of the conjoined longitudinal muscle It serves as an explanation of the tedious maneuver of mobilizing the skin in preserving the sphincter muscle for proctosigmoidectomy If the anal canal be divided into thirds, the junction of the middle with the lower third represents approximately the gradual transition of the modified anal skin above with the true skin below, the latter being identified by the thickening of the corneum[11, 4] and the presence of sebaceous glands and hair follicles This line represents the "ligne sinueuse"[114] or the white line of Hilton[113] and corresponds horizontally with the point of overlapping of the internal and external sphincter muscles (Fig 2) This has been referred to as the intersphincteric line or the intermuscular septum

Anal Valves Valves of Morgagni The upper portion of the anal canal forms an irregular border by its union with the bases of the rectal columns of Morgagni[91] Stretched transversely between the bases of these adjacent columns are thin semilunar folds known as the anal valves of Morgagni or saccules of Horner, which correspond to the number of columns present (Fig 2)

Anorectal Glands The anorectal glands are independent structures, although frequently confused with the crypts of Morgagni As anlages of the muscular layers they are commonly referred to as the deep intramuscular glands (Herrmann[46]) Gorsch[4] is of the opinion that the intramuscular glands are the only true preformed glands of the anorectal region and suggests that their pathologic significance, in contrast with the true crypts of Morgagni depends on their connection with the lumen of the bowel and their difficulty with adequate drainage when infected

Johnson[8] demonstrated the existence of these anal ducts and their glands and illustrated their structure as well as location Tucker and Hellwig[147] confirmed this investigation and concluded that these preformed tubular ducts were accountable for the frequency of anal infection Hill *et al*[47] concur in this view and believe that infection through the gland system is a logical explanation, especially since the ducts extend upward toward the crypts of Morgagni

Anal Papillae Papillae of Morgagni Normally these are small elevations varying in number from two to six, but occasionally they are entirely absent When present they are teatlike or triangular structures usually pale pink with the apex white, and occur either on the free edges of the semilunar valves or at the junction of the anus with the bases of the rectal columns

peritoneal attachment, which is reflected anteriorly to the bladder or uterus and attached posteriorly to the third sacral vertebra by means of the mesorectum and laterally to the walls of the pelvis (2) its



Fig 5 Microscopic section through glomus coccygeus (low power), showing structure of the glomus (Keuther, T I Illinois M J, Feb 1938, p 134)

connective tissue encasement which is attached to the surrounding tissues and organs and (3) the levator ani and external sphincter muscles

Relations From above downward the rectum is in relation posteriorly with the hemorrhoidal vessels left piriformis muscle sacral plexus of nerves the sacrum and coccyx and levator ani anteriorly in the male with the fundus of the bladder triangular ligament seminal vesicles ductus deferens and posterior surface of the prostate anteriorly in the female with some convolutions of the small intestine posterior aspect of the uterus and posterior wall of the vagina and laterally with the ureters the internal iliac artery and its branches the obturator internus muscle and obturator nerve

Structure The rectum is composed of four coats serous muscular submucous and mucous

The peritoneal or serous coat covers only the upper two thirds of the anterior and lateral surfaces of the rectum In the male, the peritoneum is reflected from the rectum to the bladder, forming the rectovesical pouch, while in the female it is reflected to the vaginal wall, forming the recto uterine pouch or cul de sac of Douglas Below this peritoneal reflection and above the levator ani muscles the rectum is encased in a cellulofibrous sheath derived from the true pelvic fascia This sheath consists of an inner cellular and an outer fibrous portion The inner layer is adherent to the rectum and at about the middle of its circumference joins with the outer layer to form the "lateral ligaments of the rectum The outer or fibrous layer follows along the margin of the sacrum to which it is attached

The muscular coat is the thickest tunic of the rectum, and is composed of inner circular (Fig 6) and outer longitudinal muscle fibers (Fig 13) the latter derived from the sigmoidal longitudinal bands Below a few of the outer fibers of the longitudinal muscle layer interdigitate with the fibers of the levator ani The others terminate as fibro elastic extensions which pass between the internal and external sphincter muscles and through the latter to the superficial fascia of the anal skin and in part in the perianal skin as the corru

bounds the space posteriorly The glomus itself is imbedded in a mass of fatty and fibrous connective tissue which forms a false capsule *It is derived from the middle sacral*

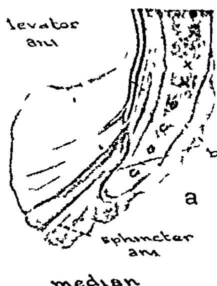


Fig 4 Median section through coccyx to show the relations of the glomus coccygeus (a) Glomus (b) Middle sacral artery (Reuther T F Illinois M J Feb 1938 p 134)

artery being first found in the fetus at about three months and is present in all specimens examined from birth to extreme old age[14] It is presumed to be similar to the caudal glomeruli of the lower animals[1 0] The glomus itself consists of a group of convoluted vessels with an afferent artery and an efferent vein The walls of the vessels are composed of large cuboidal pale staining epithelioid cells which are modified smooth muscle cells of the tunica media of the arterial branch from which the glomus is derived[68] The body is reported by Stoerk[129] to contain no chromaffin tissue and to have no histogenic relation to the sympathetic nervous system although the structure as found in the adult is surrounded by a well defined zone of nerves called the nerve cuff which is comparable *to that found in the cutaneous glomus*[7 8] Stone[130] believes it is just one of a number of paraganglia which may give rise to paraganglionic tumors The *function of the* glomus is still unknown, but it *seems well* established that it has no function as a gland of internal secretion Tumors have been reported as arising from the glomus and have been classified as epithelioma or angiosarcoma,[16 50 53 64 67 3 81] but in the light of present day knowledge these are probably angiomyoneuromas and, according to Reuther[111] *are similar to those of the* cutaneous glomus These tumors are benign and respond to local excision

Rectum

Description The rectum is that portion of the intestinal tract which is continuous *with the sigmoid colon above and with the* anal canal below, by which it communicates with the exterior It begins opposite the third sacral vertebra and in its descent lies in the concavity of the sacrum and coccyx it then rests on the pelvic floor formed by the union of the two levator ani muscles and ends at the anorectal line which represents *the junction of the rectum above with the* anus below and which embryologically is the point of union between the hindgut (cloaca) and the proctodeum

Measurements The rectum, which begins at the rectosigmoid junction and ends where it meets the anal canal (anorectal line) measures approximately 6 inches (15 cm) in length when laid flat and unstretched at necropsy In the living subject in a study based on 161 rechecked cases measured by a specially *designed transparent graduated* proctosigmoidoscope with the patients always in the knee chest position the author found the average length of the rectum to be 5 4 inches (13 5 cm)[8] This corresponds in part to the investigations of others[9] The difference is due to the curvatures present which are partially obliterated at autopsy The smallest diameter is at the rectosigmoid junction below which it expands to form the ampulla of the rectum At the lower or perineal portion the rectum again becomes narrow to join the anal canal From above downward the rectum is re*ferred to as* fixed by virtue of (1) its

The superior valve arises from the left side approximately 1½ inches below the rectosigmoid junction The middle is the most constant and well defined It arises from the right anterior wall 4 4 inches (11 cm) from the margin of the anus The inferior fold is more posteriorly placed on the left side 3 2 inches (8 1 cm) above the anal margin The valves are composed of mucosa beneath which is the submucosa Pennington found the latter well developed and our studies verified these findings At the base of the submucosa near the wall of the rectum arteries veins and lymphatics are noted A small number of involuntary nonstriated muscle fibers are discernible which may be traced to the circular layer in the surrounding wall No longitudinal muscle fibers were visible on section The function of these rectal valves is a moot question They are supposed to lend a spiral motion to the fecal mass in its passage through the rectum[19] Tuttle considered them supportive At any rate the experiments of Pennington[70] and Martin[79] show the above to be at least partially correct

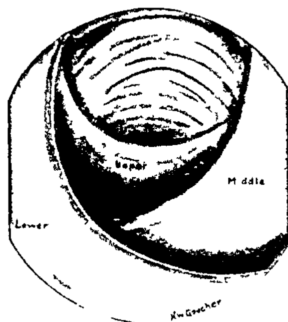


Fig 8 Proctoscopic view showing the lower or inferior middle and upper or superior valves of Houston Above the upper valve the rugae of the sigmoid are discernible

Rectal Columns Columns of Morgagni In the lower portion of the rectum, due to the contraction of the sphincter muscles below, the mucosa is gathered into pleats or longitudinal folds which are known as the columns of Morgagni (Fig 2) or pillars of Glisson[41] Although dilatation of the canal obliterates these columns they are normally pyramidal in shape about one half inch in length and are about 10 in number The apex is upward and is lost in the smooth rectal mucosa above while below, the base joins the anal skin at the anorectal line The epithelial layer of these columns presents simple columnar cells which are characteristic of the entire

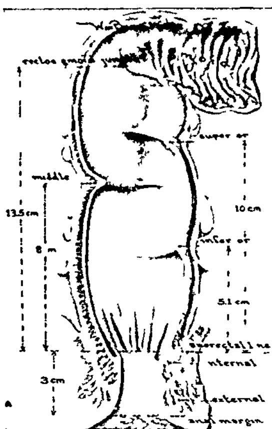


Fig 9 Coronal section showing the average distances of the various valves of Houston and rectosigmoid junction from the anal margin and anorectal margin

gator cutis ani muscle[1] The circular muscle fibers are few above, but increase below and become strong as they approach the anal canal where they form the internal sphincter

THE SUBMUCOUS COAT forms the bed upon which the mucosa rests and because of its loose attachment to the latter permits the mucosa to glide easily over it The sub mucosa is formed of dense connective tissue harboring ramifications of blood vessels nerves and lymphatics Perpendicular processes from this layer perforate both the inner and outer layers which serve to bind the various coats together

THE MUCOUS COAT OR MUCOSA (Fig 29) is vascular, dark red in color and thick It is somewhat irregular and presents normally three transverse or oblique folds known as the valves of Houston[2-4] The epithelial layer of the mucous membrane of the rectum is of the simple columnar type throughout, except for a short distance on the rectal columns of Morgagni, which is of the stratified columnar variety (Fig 7)

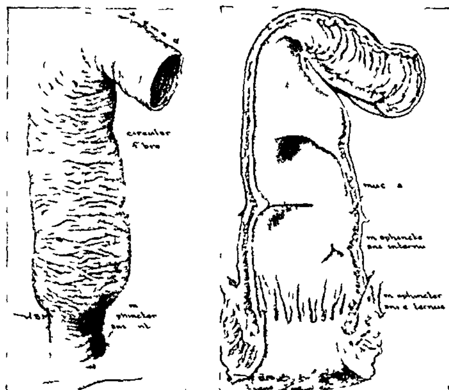


FIG 6 (*Left*) Arrangement of the circular muscle fibers of the sigmoid and rectum

FIG 7 (*Right*) Longitudinal view of the anus rectum and lower sigmoid colon In the lower rectum are seen the columns of Morgagni the three rectal valves or valves of Houston are shown as are the rugae of the sigmoid

Rectal Valves Valves of Houston These represent transverse or oblique folds within the rectum They are usually three in number, semilunar or crescentic in shape with the concavity upward and extend for a short distance about the circumference of the rectum These are referred to as the superior middle and inferior valves (Fig 8)

As reported the author[8] examined consecutively 161 patients in the knee chest position and measured the various distances by means of a specially calibrated transparent proctosigmoidoscope All cases were rechecked The average distances are shown in the accompanying illustration (Fig 9)

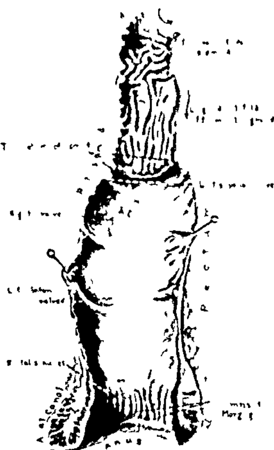


Fig 11 Terminal sigmoid rectum and anal canal Note increment at rectosigmoidal junction (W J Mayo Surg Gynec & Obst 25 617)

tion at this point in 80 per cent of the cases Martin and Burden ⁷ in their study of 31 specimens observed a well-developed musculature but exhibiting no local increment of circular fibers to suggest an anatomic sphincter While many have investigated the problem, including Nealton, Hyrtl, Otis, Velpeau and Sappey, there exists today no unanimity of opinion

It is of anatomic and surgical importance because of its blood supply and the disappearance of the mesosigmoid During the past half decade, special attention has been directed to this area in that radical extirpation is being effected by free mobilization of the rectosigmoid and upper rectum thereby permitting immediate end to end aseptic anastomosis through the abdomen An added feature is the avoidance of impotence While the rectosigmoid is truly a junction some authors include one inch of the sigmoid above and one inch of the rectum below and thereby refer to it as the Rectosigmoid region ' This accounts for a statistical increase of malignancies in this area

Sigmoid Colon

The sigmoid colon is that portion of the intestinal tube which extends from the crest



Fig 12 Illustration of the sigmoid showing the iliac and pelvic portions

O Brierne described a valve to which he attributed a sphincteric action Reeves[109] in 46 dissections on cadavers found a constric

of the ilium to the third sacral vertebra it is continuous above with the descending colon and below with the rectum Accord

rectum, although near the base just above the anorectal line they are of the stratified columnar type[11]

Crypts of Morgagni Placed transversely between the bases of the columns of Mor

to both contiguous and more distant ana tomic structures A discussion of the rela tionship to the preformed anal ducts and glands may be found on page 2 under *glands* and under *abscess*

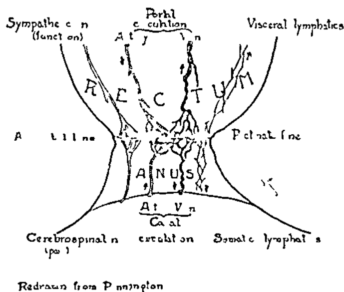


Fig 10 Schematic drawing of the innervation and circulation of the anus and rectum

gagni are semilunar or cup shaped folds—the anal valves (Fig 2) Behind each valve is a pocket or crypt which bears the name of Morgagni or saccule of Horner " The depth is shallow averaging from 3 to 5 millimeters[143] Thus, these pockets or crypts, which have their apex downward are bounded behind and laterally by the rectal mucosa and in front by the anal valve

The function of these crypts according to many[5 0 63 83 1 4] is to receive and re tain mucus which by pressure is forced out during defecation in order to lubricate and facilitate the evacuation Histologi cally, this appears sound since the lower rectal mucosa is rich in goblet or mucus containing cells Clinically, these anal pockets are of utmost importance since they represent the most frequent site of entrance of pathogenic organisms As early as 1913, Martin[78] expressed the view that these anal crypts are the source of infection

Anorectal Line

Also referred to as the pectinate, den tate and confusedly as the 'anocutaneous line[11] the anorectal line represents the junction between the mucous membrane of the rectum and the modified skin of the anal canal For the purpose of description the union of these two structures is a rather sharp dividing line between the visceral and somatic nervous systems the portal and caval circulations and the visceral and somatic lymphatics as portrayed in the schematic drawing (Fig 10)

Rectosigmoid Junction

The union of the terminal end of the pelvic sigmoid and the proximal end of the rectum is known as the rectosigmoid junc tion At this site, opposite the third sacral vertebra (Treves) a distinct narrowing of the lumen is noted which accounts for the frequency of obstructive lesions In 1833,

scroti and the bulbocavernosus muscle.[1,5]

In the female, the subcutaneous bundle blends anteriorly with the sphincter vaginae muscle. The subcutaneous external sphincter has no bony attachment. It lies below and slightly external to the internal sphincter, it being separated from it only by fibroelastic extensions of the conjoined longitudinal muscle.[4] The groove thus formed at this point corresponds to the White Line of Hilton[13] and the intersphincteric line. At this site the subcutaneous bundle is not distinctly separated but rather in part overlaps the lower edge of the internal sphincter. The superficial bundle of the external sphincter has its origin in the anococcygeal raphe,[1] the aponeurotic and muscular fibers from the dorsal and lateral aspects of the coccyx.[1,6] It extends forward in an elliptic fashion and divides to embrace the anal canal at the level of the internal sphincter. Anteriorly, it converges to be inserted, in the female, into the sphincter vaginae; some fibers extend to the ischial tuberosity.

In the male, the fibers converge to be inserted into the central tendinous raphe, where it joins with the bulbocavernosus and superficial transverse perineal muscle.[4] The profunda bundle of the external sphincter is situated immediately above and lateral to the superficial portion. It is annular and has no attachment to the coccyx. The posterior half of the muscle is intimately attached to and cannot be separated from the outer and inferior aspect of the puborectalis,



FIG. 14. Photomicrograph of a longitudinal section through the subcutaneous portion of the external anal sphincter showing how this muscle is penetrated by the septal extensions of the longitudinal muscle which insert into the perianal skin. Note the nerve fibers in these extensions and the hair follicles and fat of the skin. (A) Fibro-elastic extensions of the longitudinal muscle. (B) Subcutaneous external sphincter ani. (C) Nerve fibers. (D) Hair follicles. (E) Fat. (R. Gorsch.)

ing to its position the sigmoid flexure is divided into an iliac and a pelvic portion (Fig 12) The iliac or upper part begins on the left side at the crest of the ilium, passes downward and inward on the iliacus and psoas major muscles to end at the inner or medial border of the latter muscle, which is the brim of the true pelvis The iliac colon is from 5 to 6 inches (12 5 to 15 cm) in

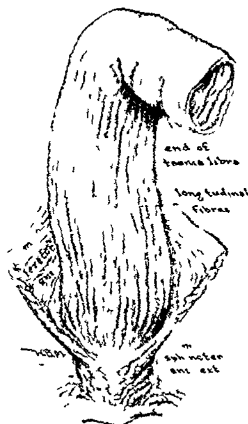


Fig 13 Longitudinal muscle fibers of the rectum showing the relationship of the levator ani muscles and external sphincter muscle

length usually has no mesentery is partially fixed and passes downward and inward over the iliacus and psoas muscles It continues downward as the pelvic colon to end as it joins with the rectum (rectosigmoid junction) which is opposite the third sacral vertebra The pelvic colon or pelvic part of the sigmoid flexure is about 16 inches (40 cm) in length and is freely movable by virtue of the mesosigmoid The mucous membrane of the sigmoid is not unlike the remainder of the large bowel Pale pink in color, smooth and devoid of villi, it is raised into numerous crescentic folds which correspond to the intervals between the sacculi The submucosa is composed of areolar tissue loosely arranged The muscular layer consists of an outer longitudinal and an inner circular tunic similar to the general arrangement of the colonic musculature The longitudinal muscle fibers are collected into three flat longitudinal bands (taenia coli) each about 12 mm in width These bands are shorter than the other coats of the intestine and serve to produce the sacculi which are characteristic of the colon The longitudinal fibers are more scattered in the sigmoid, while in proximity to the rectum they spread out and form a layer which completely encircles this portion of the gut The circular fibers form a thin layer in the colon which is thick in the rectum The serous or peritoneal coat invests the entire sigmoid colon Laterally the peritoneal folds are reflected diagonally upward and backward to form the pararectal fossa and the leaves of the mesorectum and sigmoid Along the entire large intestine except the rectum, numerous small appendages are present which are pouches of peritoneum filled with fat and known as the appendices epiploicae

External Sphincter Ani

This muscle (Fig 13) is voluntary and is composed of striated muscle arranged in three strata of distinct muscular bundles Milligan and Morgan[88, 89] name the three layers as follows (a) the subcutaneous external sphincter (b) the superficial external sphincter and (c) the deep or profunda external sphincter

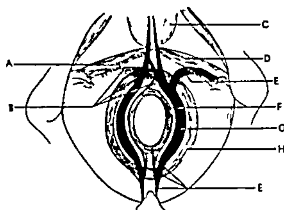
The subcutaneous bundle of the external sphincter is located immediately below the skin at the anal margin is annular and usually presents a posterior extension which becomes continuous with the converging fibers of the superficial bundle Anteriorly, the subcutaneous bundle frequently joins the extensions of the superficialis retractor

subcutaneous bundle are more sharply defined in the female than in the male inasmuch as the anterior fibers of the superficialis in the male converge to the central tendinous raphe over the bulb. In the female, they converge and become continuous with the encircling bulbocavernosus

keeps the anus in tonic contraction and assists in the expulsion of feces

INTERNAL SPHINCTER ANI

This is an involuntary muscle composed of circular muscle fibers and represents a sudden thickening and aggregation of the



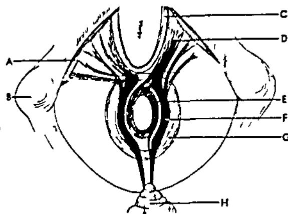


FIG 17 (*Left*) Schematic drawing showing common variation in the crossed and uncrossed extensions of the three divisions of the external sphincter (in the male) (A) Outline of triangular ligament (B) Crossed muscle bands (C) Bulbocavenosus (D) Superficial transverse perineus muscle (L) Uncrossed muscle bands (F) Subcutaneous external sphincter (G) Superficial external sphincter (H) Profundus external sphincter (R Gorsch New York Tilghman Co)

FIG 18 (*Right*) External anal sphincter in the female (schematic) (A) Crossed fibers of profundus external sphincter ani (B) Ischial tuberosity (C) Vaginal wall (D) Bulbocavernosus (I) Subcutaneous external sphincter ani (F) Superficialis external sphincter ani (G) Profundus external sphincter ani (H) Coccyx (R Gorsch)

AVERAGE MEASUREMENTS OF EXTERNAL SPHINCTER (GORSCH)

	Height	Thickness or Diameter
Subcutaneous ext phincter	.3 to 7 cm	.3 to 1 cm
Superficialis ext phincter	.8 to 1 5 cm	5 to 1 5 cm
Profundus ext phincter	4 to 1 cm	5 to 1 cm

The nerve supply is derived from the second third and fourth sacral plexuses, through the inferior hemorrhoidal and perineal nerves A small filament from the fifth sacral and the coccygeal plexuses is described by Morestin[91] as the lesser sphincterian nerve This is important in local analgesia for complete relaxation of the external sphincter

ACTION This muscle has no antagonist It

circular fibers of the rectum It is a muscular ring extending from a site just above the anorectal junction to and slightly below the intermuscular septum or the intersphincteric junction It therefore surrounds the major portion of the anal canal (Fig 11) The lower border of this muscle is within the grasp of the external sphincter, and the furrow or indentation between these two muscles may be palpated when in a state of normal contraction which is perceptible only to the touch The action of the internal sphincter is to aid in the expulsion of feces The principal innervation of the internal sphincter is through the sympathetic and parasympathetic, although, as has been cited[4] because of its

a point to be remembered in preservation of the sphincter musculature in the technic of proctosigmoidectomy Anteriorly, some fibers decussate and are inserted into the opposite ischial tuberosity According to Gorsch, the anterior encircling fibers of the

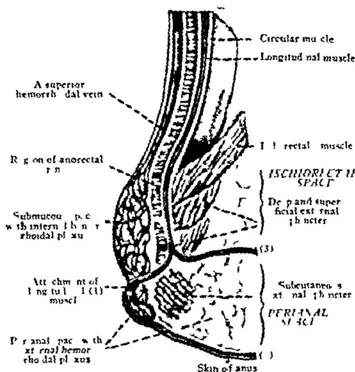


Fig 15 Showing the terminations of the longitudinal muscle (in red) (1) Intermuscular septum (2) Corrugator cutis ani muscle (3) Septum of the ischio rectal fossa Recto urethralis not shown (E T Milligan Proc Roy Soc Med 36 365)

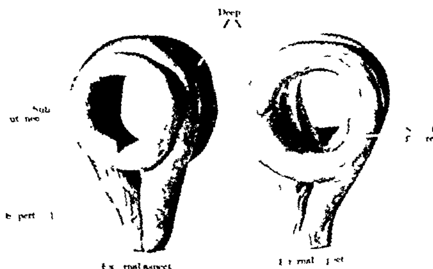
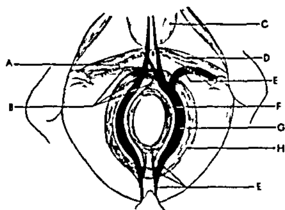


Fig 16 Model of external sphincter ani showing its three components A black diamond shaped patch has been placed over the subcutaneous external sphincter to make the usual site of a dorsal anal fissure (W B Gabriel)

subcutaneous bundle are more sharply defined in the female than in the male, inasmuch as the anterior fibers of the superficialis in the male converge to the central tendinous raphe over the bulb In the female, they converge and become continuous with the encircling bulbocavernosus keeps the anus in tonic contraction and assists in the expulsion of feces

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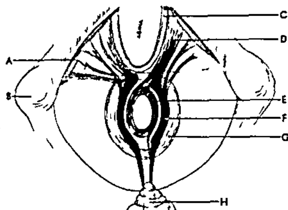


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AVERAGE MEASUREMENTS OF EXTERNAL SPHINCTER (GORSCH)

	Height	Thickness or Diameter
Subcutaneous ext phincter	.3 to .7 cm	.3 to 1 cm
Superficialis ext phincter	8 to 1 5 cm	5 to 1 5 cm
Profundus ext phincter	4 to 1 cm	.5 to 1 cm

The nerve supply is derived from the second, third and fourth sacral plexuses through the inferior hemorrhoidal and perineal nerves A small filament from the fifth sacral and the coccygeal plexuses is described by Morestin[91] as the lesser sphincterian nerve This is important in local analgesia for complete relaxation of the external sphincter

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intimate embryologic and anatomic relation to the combined anorectal musculature, its prostate, rectum and vagina The fibers of Luschka are derived from the levators and

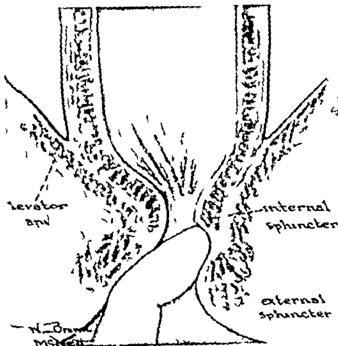


FIG 19 Finger introduced into the anal canal making pressure at the White Line of Hilton, properly referred to as the intersphincteric line or intermuscular septum A short distance above will be noted the unaccentuated anorectal line

activities may follow direct mechanical or contigual stimuli as well as direct or reflex nerve stimuli

LEVATORES ANI

These are two in number and represent strong sheets of muscular fibers which form the greater part of the pelvic diaphragm The three divisions of the levator ani are the pubococcygeus, puborectalis and ilio coccygeus Arising from the posterior aspect of the pelvic arch the pubococcygeus is directed medially and posteriorly to insert into the lower sacrum and coccyx in what Gorsch designates as a conjoined lami nated musculofascial shelf Between the portions of the pubococcygeus which ter minate in the rectal wall and in the coccyx a spatium is formed which is prominent medially, since it is bounded posteriorly by fibers passing deeply to the rectum In its course this muscle invests the urethra, pass from side to side anterior to the rectum and posterior to the prostate

On the premise that the puborectalis is a distinct muscle it being intimately asso ciated anteriorly but distinctly separated posteriorly from the pubococcygeus, these two muscles appear to have a common origin, except that the latter arises on a higher plane Arising from the lowest por tion of the symphysis pubis and from the deep layer of the triangular ligament it passes downward and backward on either side of the vagina or prostate and lateral aspect of the rectum to become continuous behind, thus forming a strong muscular sling for the anorectal junction Thus this muscle, the puborectalis, which serves an important role in continence, is in relation to the lower rectum and upper anal canal only on their posterior and lateral aspects In extirpation of the rectum, division of these fibers from the posterior wall of the prostate must be effected before the rectum

can be mobilized The iliococcygeus portion of the levator has its origin in the posterior portion of the White line and the ischial spine It extends downward and backward and is inserted into the coccyx with the tendon of the pubococcygeus Apparently none of the iliococcygeal fibers attach themselves to the rectum proper

The combined levators fix the pelvic structures and present a fulcrum against which increased abdominal pressure may be exerted in the acts of lifting, coughing, defecation and other acts of perineal activities According to Gorsch, the pubococcygeus, as an important component of the conjoined longitudinal muscle assists and synergizes the contraction and relaxation of the anal sphincters

The nerve supply is derived from the anterior branch of the fourth sacral nerve and by a branch from either the inferior hemorrhoidal or perineal nerves

The Rectococcygeus Muscle

The muscle of Treitz[141] or Kohlbrausch[6] arises as two flat bands of involuntary muscle fibers from the anterior coccygeal ligament at the tip of the coccyx and passes downward and forward to blend with the longitudinal fibers of the lower rectum and the pelvic fascia Its function is to hold the end of the rectum against the coccyx and to give it a fixed point during defecation

Corrugator Cutis Ani

This is a thin muscle which represents the terminal insertions of the fibro elastic extensions of the longitudinal muscle It surrounds the anus blending laterally with the subcutaneous tissue and medially with the anal skin It also penetrates the substance of the subcutaneous external sphincter muscle When this muscle is contracted the skin about the margin of the anus is thrown into folds

Coccygeus or Ischiococcygeus

These consist of two triangular planes of muscular and tendinous fibers which arise from the spines of the ischia and sacrotuberous ligaments to be inserted into the lowest piece of the sacrum and the upper portion of the anterior surface of the coccyx The nerve supply is derived from branches of the fourth and fifth sacral nerves

Action The coccygeus assists the levatores ani in supporting and pulling forward the coccyx following defecation

Piriformis

This muscle consists of two thin, triangular sheaths situated in the concavity formed by the sacrum They arise from the bony interval between the second third and fourth sacral foramina, from the sacrotuberous ligament and fascia from the sacrosciatic foramen Each muscle extends laterally emerges from the pelvis through the greater sciatic foramen and is inserted into the greater trochanter of the femur This muscle is of diagnostic importance in coccygodynia and superior gluteal pain as discussed by Yoeman,[1 1] Thiele[137, 139] and others [30, 140]

Superficial Transverse Perineal

These are two muscular sheaths rising from the medial aspect of the ramus of the pubis close to the triangular ligament They are in close relationship with the deep or profunda portion of the external sphincter They pass medially and join its fellow of the opposite side to be inserted into the central perineal raphe

Deep Transverse Perineal

Often described as the constrictor urethrae the profunda or deep transverse perineal muscles are two in number They arise from the inferior rami of the ischium and *in the male fuse with the sphincter* of the membranous urethra In the female the muscle is less evident since only a few fibers cross the midline between the rectum and the vagina

The Pelvic Fascia

Of paramount importance to the pathogenesis and to the extension of pathogenic

processes is a clear understanding of the complex fascial anatomy and its relations in the pelvis The function of fascia in the human body is manifold It acts as an intervisceral supportive structure serves as a subperitoneal tissue of the mesosigmoid forming a framework for the superficial fascia The pelvic fascia in its component parts differs considerably in its histologic structure, which is dependent entirely on

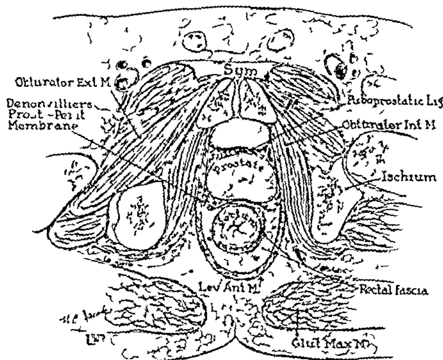


FIG 20 Drawing from transverse section of adult male pelvis cephalic view Section shows the position of the rectal fascia around rectum relationship of the levator ani muscles to the rectum and prostate and the position of the prostatic capsule The prostatoperineal membrane (anterior layer of Denonvilliers' fascia) is fused to the prostatic capsule dorsal to the posterior lobe of the prostate The retropubic pad of fat anterior to the prostate, is in the space of Retzius (C E Tobin Surg Gynec & Obst 80 373)

conveyor of nerve lymph and blood supply synchronizes motion between muscles, nerves and blood vessels, fills in dead spaces and, as mentioned by Gratz[43] may function as joints for sliding motion between muscular planes The pelvic fascia anteriorly, which forms a strong fibrous support for the contents and structures of the pelvic cavity, is attached to the posterior part of the iliopectineal line, blending with the iliac fascia The deep fascia is reflected about the pelvic viscera, *forming what is referred to as* "fascial collars"[13] As this deep pelvic fascia ascends over the ampulla of the rectum, it becomes fused with the superficial fascia surrounding the upper rectum and thence becomes continuous with the functional requirements In some situations it assumes the character of loose areolar tissue, and in other places that of dense fibrous tissue

Based on the investigations of Cruveilhier,[7] Laimer,[70] Gallander,[38] Aversenq,[7] and Gorsch,[4] as well as many others, the pelvic or endopelvic fascia is divided into the superficial layer and the deep layer

The superficial fascia is the visceral layer of the pelvic fascia and represents a continuation of the superficial intra abdominal layer From the pubis anteriorly, it fills in the space of Retzius and continues over the bladder just below the peritoneum Between the rectum behind and the prostate and seminal vesicles in front the superficial



Fig 21 Sagittal pelvic section of a male cadaver in which the Young prostatic approach was made The anus and lower part of the rectum are retracted dorsally within the incision In this approach the rectal fascia was divided, part of it is still attached to the central point of the perineum the remainder covers the cephalic portion of the rectum The peritoneum is elevated from bladder and cephalic portion of the rectum The anterior layer of Denonvilliers fascia is attached to the peritoneum and extends caudally between the seminal vesicles and prostate and rectal fascia to the superior layer of the urogenital diaphragm This membrane adheres to the prostatic capsule at the junction of the ejaculatory ducts to the prostate Other fibrous bands extend from the peritoneum to the seminal vesicles and bladder As indicated by the arrows, cleavage planes may be made between (1) the rectal musculature and rectal fascia (posterior layer of Denonvilliers fascia) (2) the rectal fascia and the anterior layer of Denonvilliers fascia and (3) either this anterior fascial layer and the fibromuscular coverings of the seminal vesicles or it and the prostatic capsule A sound is passed through the urethra but the prostate is not shown retracted dorsally by the sound When the prostate is so retracted these fascial layers are compressed against the rectal musculature and dissection may lead into the rectum (C E Tobin Surg Gynec & Obst 80 373)

processes is a clear understanding of the complex fascial anatomy and its relations in the pelvis The function of fascia in the human body is manifold It acts as an intervisceral supportive structure, serves as a subperitoneal tissue of the mesosigmoid forming a framework for the superficial fascia The pelvic fascia in its component parts differs considerably in its histologic structure, which is dependent entirely on

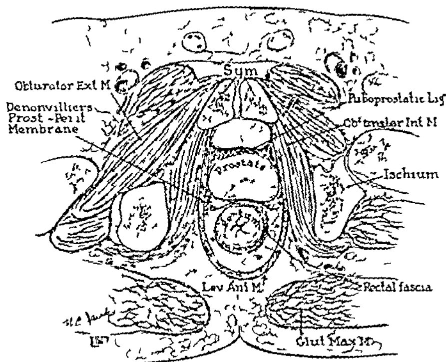


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conveyor of nerve, lymph and blood supply, synchronizes motion between muscles nerves and blood vessels fills in dead spaces and, as mentioned by Gratz [43] may function as joints for sliding motion between muscular planes The pelvic fascia anteriorly, which forms a strong fibrous support for the contents and structures of the pelvic cavity, is attached to the posterior part of the iliopectineal line, blending with the iliac fascia The deep fascia is reflected about the pelvic viscera, forming what is referred to as "fascial collars "[4] As this deep pelvic fascia ascends over the ampulla of the rectum it becomes fused with the superficial fascia surrounding the upper rectum and thence becomes continuous with the functional requirements In some situations it assumes the character of loose areolar tissue, and in other places that of dense fibrous tissue

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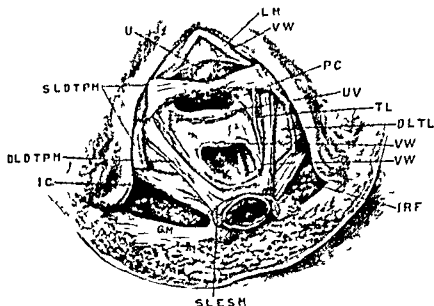


FIG 23 (LM) Labia majora (VW) Vaginal wall (U) Urethra (SLDTPM) Superficial layer deep transverse perineal muscle (DLDTPM) Deep layer deep transverse perineal muscle (IC) Ileococcygeus muscle (GM) Gleuteus maximus (PC) Pubo coccygeus (UV) Urethrovaginal bundle of levator (TL) Triangular ligament cut edge (DLTL) Deep layer triangular ligament (VW) Vaginal wall (IRF) Ischiorectal fossa (SLESM) Superficial layer external sphincter muscle (J W Davies Surg, Gynec & Obst 58 72)

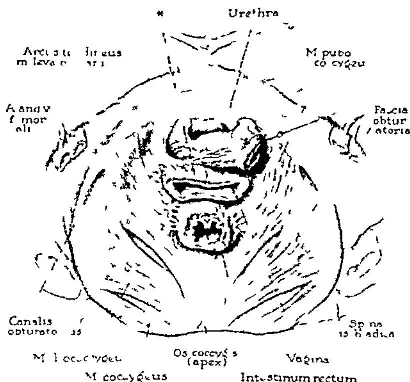


FIG 24 The muscular constituents of the pelvic floor and the relations of them to the viscera are demonstrated The urethra has been pulled aside to show the course of the levator fibers on its posterior aspect and the nature of the pubo urethral ligaments indicated by asterisk (A H Curtice Surg, Gynec & Obst 68 166)



Fig 22 The deeper layers of the outlet (J W Davies Surg Gynec & *Obst* 58 72)

fascia assumes a more compact form and is referred to as Denonvilliers aponeurosis or fascia

DENONVILLIERS FASCIA

More than a century ago Denonvilliers[30, 31] published the results of his dissections on the tissues in this area Some pertinent points are still uncertain, yet such investigators as Cuneo [8] Wesson [117, 118] and especially Tobin [140] have given us a very clear description of practical importance Between the anterior rectal wall and the posterior surface of the prostate seminal vesicles and bladder, a layer of fascia is present which covers the rectum and mingles with its external longitudinal muscle coat Tobin designates this as the posterior layer of Denonvilliers' fascia This may be either areolar or areolar and adipose Anterior to this layer is a fibrous membrane which extends from the peritoneum covering the upper surfaces of the pelvic organs to the peritoneum This is fused with the prostatic capsule at the junction of the ampullae and ejaculatory ducts

Laterally this fascial layer, designated as the anterior layer of Denonvilliers, extends around the areolar tissue (posterior layer of the upper part of the rectum) and with the supra anal fascia forms the lateral ligament *In brief, then the lateral ligaments* represent a condensation of strong strata derived from the superficial and deep layers of the endopelvic fascia The space in front of the rectum (between external longitudinal coat and posterior layer of Denonvilliers fascia) is referred to as the "prerectal space," and that between the anterior surface of Denonvilliers' fascia and the prostate and seminal vesicles is designated the posterior prostatic space' Tobin[140] has given evidence by his dissections that a third space exists between these anterior and posterior layers The rectovaginal space or rectovaginal septum is a potential interval between the fascial layers investing the rectum and vagina It is considered the homologue of Denonvilliers fascia in the male Laterally, it is bounded by reflections of the supra anal fascia, while above it extends to the vesicovaginal fossa and below to the perineal body Clinically, this fascia is of importance not only as an anatomic landmark in surgical extirpation of the rectum but as an effective barrier in limiting the spread of lower bowel malignancy and extension of purulent material

The deep fascia or visceral layer of the pelvic or endopelvic fascia may be divided into two planes As a result of his dissections, Gorsch designates these layers in relation to the levator as the supralevator plane and the infralevator plane

The supralevator plane is the supra anal fascia and, as it continues from the transversalis fascia of the abdomen, it passes from behind the pubis laterally and posteriorly to the upper surface of the pubococcygeus muscles it extends around

around the rectum as its fascia propria and the other almost completely around the prostate where it is closely adherent to its capsule

Above the pelvirectal space is bounded the rectal stalks of Jonnesco[59] The outer layer of this rectal fascia follows along the margin of the sacrum and is attached thereto Above it extends to and is continuous with the prevertebral fascia, while

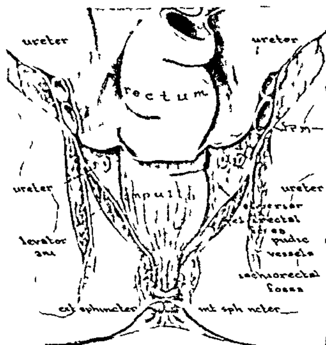


Fig 25 Coronal section showing the superior pelvi rectal spaces The peritoneum is outlined

by the reflected peritoneum (see Fig 25) below by the upper or superior surface of the levator ani muscle and the supra anal fascia and medially by the fascia covering the rectum (fascia propria)

Retrorectal Space

This is an expansive recess placed posteriorly between the rectum in front and the sacrum behind It extends upward to a point where the peritoneum is attached to the rectum and below as far as the upper or superior surface of the levator ani muscle (*Fig 27*) *This space is enclosed by an* elastic cellulofibrous sheath derived from the true pelvic fascia which divides into an inner and an outer layer (Fig 28) The inner attaches itself to the middle of the circumference of the rectum and by so doing forms one of the main supports of the rectum Such is frequently referred to as below it is limited by the supra anal fascia on the superior surface of the levator ani muscles Within these boundaries is the retrorectal space

Contents In this space are contained branches of the sacral plexus and nerves branches of the sympathetic nerves forming the hypogastric plexus and middle sacral iliolumbar and middle hemorrhoidal vessels and lymphatics[98]

Courtney[5] has described a space lying posterior and lateral to the anorectum and situated between the superior and inferior *layers of the levator muscle Designated as* the posterior levator space,' it is shaped like a wedge with the open end toward the rectum The boundaries are given as follows medially the combined longitudinal muscle layer of the rectum above and behind the rectococcygeus muscle to the side the superior layer of the levator

their free medial margins down to the deep layer of the triangular ligament Finally, it becomes reflected around the prostate, fusing with the prostatic capsule, and continues upward over the urinary bladder to become the vesical fascia As it reflects itself around the prostate from the triangular ligament it forms the "superior pelvic rectal space" This constitutes a strong lamina of the lateral ligaments of the rectum in this situation These extensions are also known as the anterior, lateral and posterior prostatic fascia

The interval between the periprostatic fascia and the fascia propria of the rectum is called the rectoprostatic space This space is divided by Denonvilliers' fascia into an anterior and posterior space or the posterior prostatic space and the prerectal space, respectively The supra anal fascia continues posteriorly in front of the rectum blending with the longitudinal muscle coat of the rectum and forming a fascial collar Behind the rectum it covers the ischiococcygeus muscle forming the floor of the retrorectal space Continuing as the deep fascia at a level corresponding to the insertion of the levator muscles into the lower sacrum it covers the piriformis muscle and the sacrum Laterally it passes with the iliac fascia to become continuous with it at the White line of the pelvis posteriorly it fuses with the supraspinous ligament

The infralevator plane of the deep fascia is made up for the most part of the obturator fascia which is little more than a continuation downward of the transversalis and iliac fascia into the pelvis As this fascia descends it covers the obturator internus muscle thus forming the lateral wall of the ischiorectal fossa Anteriorly it stretches across the pelvic outlet as the inferior layer of the triangular ligament Posteriorly it becomes continuous with the supra anal fascia just above the point of insertion of the levators into the lower sacrum From the obturator fascia arises the infra anal fascia which crosses anteriorly in front of the rectum to assist in forming the central tendinous raphe of the perineum It is at this point that the supra anal fascia and infra anal fascia fuse Posteriorly below the levator, the infra anal fascia extends from one ischiorectal fossa to the other, developing, in part, the stratum of the anococcygeal body From the lateral walls of the ischiorectal fossae the infra anal fascia is now reflected over the branches of the inferior hemorrhoidal vessels, forming a fascial sheath and shelf which anteriorly becomes continuous with Colles' fascia

Pararectal and Para Anal Spaces

The term pararectal space is employed to designate any space, potential or actual, around the rectum anatomically situated below the peritoneum and above the levator It includes the superior pelvirectal and retrorectal Similarly, the para anal space refers to the space around the anal canal below the levator and above the skin of the perianal region and includes the ischiorectal fossae Subdivisions are used to specify various sites such as postanal In many instances these spaces are merely planes of cleavage between fascial sheaths or between muscle strata

Pelvirectal Spaces

These are two in number and are situated on either side and slightly in front of the rectum The posterior boundary is usually described as the lateral ligaments but Gorsch is most emphatic that this is incorrect He defines it as the condensed superficial fascial reflections over the lateral sacral vessels and the strong stalks of the superficial fascia extending to the lateral aspects of the rectum Anteriorly, the space is bounded by the broad ligament and uterus in the female and by the bladder, seminal vesicles and prostate in the male

This space anteriorly is a continuation of the lateral periprostatic space[1 6] and corresponds to the entire lateral aspect of the prostate At the inferior lateral aspect of the prostate the supra anal fascia divides into two strata, one reflected posteriorly

below, the anococcygeal raphe and to the side the inferior layers of the levator

ISCHIORECTAL (ISCHIO ANAL) FOSSAE

These spaces are two in number and located on each side of the anal canal Each is pyramidal in shape with the base pointing backward and the apex forward and inward It is bounded above and medially by the external sphincter and levator muscles and the anal fascia laterally by the tuberosity of the ischium, obturator fascia and obturator internus muscle posteriorly by the gluteus maximus muscle sacrotuberous ligament coccyx superficial fascia and skin anteriorly, by the transversus perinei muscle and perineal (Colles') fascia and inferiorly by the integument (Fig 29) In the midline posteriorly, between the two ischiorectal fossae above the superficial bundle of the external sphincter and behind the deep or profunda bundle there is a narrow band of cellular tissue through which pus may penetrate from one ischiorectal fossa to the opposite one forming a so called posterior horseshoe abscess By the same token pus may pass anterior to the anal canal, behind the triangular ligament and above the superficial bundle of the external sphincter, from one ischiorectal fossa to the other, forming a so called anterior horseshoe abscess

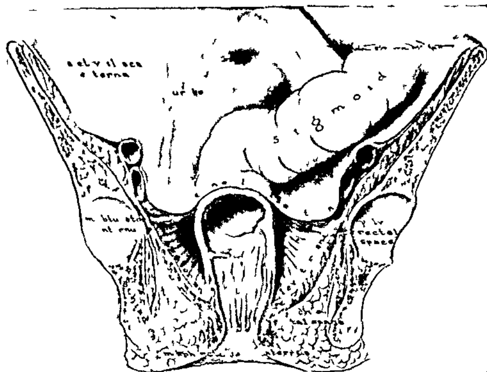


Fig 29 Coronal section showing the relationship of the rectum to the pelvirectal spaces and ischiorectal fossae

Contents The inferior hemorrhoidal branch of the pudendal nerve and the inferior hemorrhoidal branch of the internal pudendal artery pierce the lateral fascial wall posteriorly and cross the space transversely on their way to the anal canal In the anterior part are found the posterior scrotal or labial branches of the superficial division of the perineal nerve, the deep branches of the perineal nerve, and the perineal branch of the internal pudendal artery and its transverse perineal branch The perforating cutaneous branch from the second and third sacral nerves may be seen between the coccyx and the ischium at the inferior border of the gluteus maximus muscle The perineal branch of the fourth sacral nerve is in the posteromedial angle

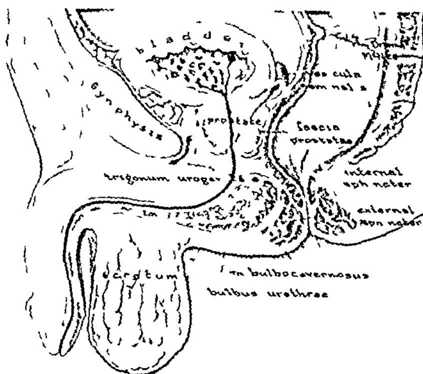


Fig 26 Sagittal section of the male pelvis showing the relationship of the rectum to the bladder, seminal vesicles, prostatic fascia (Denonvillier) urogenital trigone and urethra

Fig 27 (*Left*) Posterior wall of the rectum has been *drawn forward* to show the retrorectal space

Fig 28 (*Right*) Arrangement of the outer and inner layers of the endopelvic fascia Relationship of the peritoneum to the upper rectum and sigmoid also shown

ficial bundles of the external sphincter, form the floor of the superficial space The deeper space is the deep posterior recess located above the superficial external sphincter, below the levator It extends posteriorly in this interval indefinitely to the coccyx and is filled with fatty areolar tissue It is the exact point at which the adjacent ischiorectal fossae communicate through the posterior communicating space The anal fascia forms the roof or superior boundary This is also described as the superior sphincteric space [6] From a clinical viewpoint, Gorsch comments as follows 'It is appreciated that the anococcygeal body may be invaded by infections burrowing posteriorly at different levels, but it is repeatedly observed that superficial infec

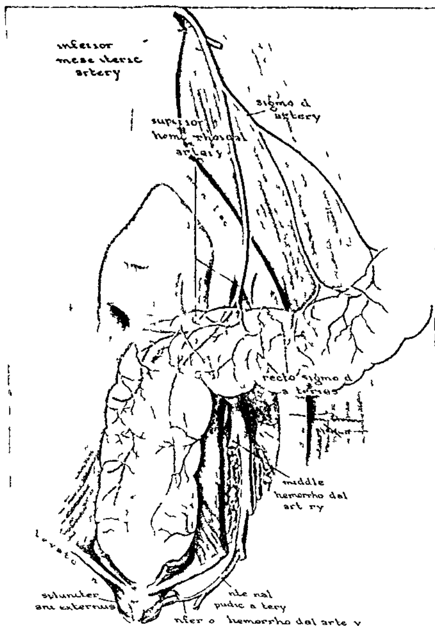


FIG 31 Transparent view of the rectum and the pelvic colon showing the distribution of the superior hemorrhoidal and recto sigmoidal arteries

The elastic pad of fat which fills the cavity acts as a buffer and permits the anal canal to expand during the expulsion of feces On the lateral wall of the fossa there is a canal encloaked in a sheath derived from the obturator fascia which is known as Alcock s Canal This canal contains the pudendal nerve, internal pudendal artery and, more anteriorly, the terminal branch of the pudendal nerve—the dorsal nerve to the penis or the corresponding nerve to the clitoris

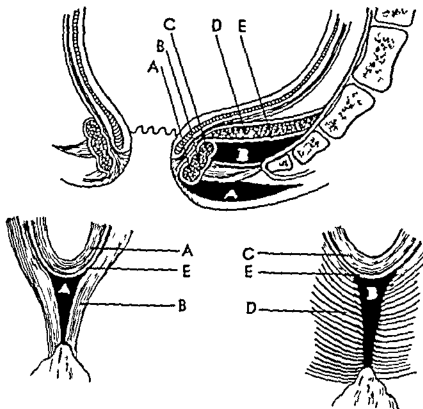


Fig 30 (A) The superficial postanal space (posterior triangular space) (B) The deep postanal space

(A) The subcutaneous external sphincter (B) Superficialis external sphincter (C) Profundus external sphincter (D) Levator plate (E) Anal or infra anal fascia which together with the levator plate forms the roof of the deep space In the horseshoe type of posterior fistula, the communication from one ischiorectal fossa to the other is directly through the deep space (R Gorsch)

Postanal Space (Postanal Triangle)

In previous editions, a description of the postanal area was based on the work of Brick'[1] and Hibshman as well as dissections and histologic studies by the writer Here this space was described as below the levator and above the anococcygeal raphe It is apparent, as a result of anatomic investigations by Gorsch and Courtney, that further discussion is essential Since the postanal space is divided into a superficial and deep portion, the posterior is actually the posterior part of the perianal space and extends from the intermuscular septum of the anal canal backward into the subcutaneous and infrafascicular areolar tissue limited by both the subcutaneous and superficial bundles of the external sphincter muscle As Gorsch states, "The fibro elastic extensions of the longitudinal muscle are inserted into the skin overlying the legs of the sphincters directed posteriorly " The deeper fibro elastic extensions from the conjoined longitudinal muscle and the fascia reflected on the upper surfaces of the super

mucosa are supplied by the superior hemorrhoidal artery. A short distance below the origin of the superior hemorrhoidal artery, a branch is given off which is referred to by Pope[6] as the 'rectosigmoid artery.' This divides into an ascending and a descending branch; the ascending branch anastomoses with the descending branch of the lower sigmoidal, while the descending branch runs parallel with the superior hemorrhoidal and anastomoses with its right branch. Our dissections[8] in three cases confirmed the above, except that we were unable to demonstrate a third or even a second rectosigmoid artery as described by this worker.

The middle hemorrhoidal artery arises from the hypogastric or its inferior vesical branch or, less frequently, the internal pudendal. Each artery passes above the levator ani muscle in the superior pelvirectal space and distributes some branches to the anterior musculature of the rectum while others anastomose with the branches of the superior and inferior hemorrhoidal arteries in the submucosa. The chief distribution of these arteries is to the anterior musculature and lower rectum.

The middle sacral artery arises from the posterior aspect of the aorta just above its bifurcation and passes downward behind the left common iliac vein until it reaches the coccyx, to end in the coccygeal body or glands of Luschka. It anastomoses with the superior and middle hemorrhoidal and lateral sacral arteries and is distributed to a small extent to the musculature of the rectum.

The inferior hemorrhoidal artery arises from the internal pudendal as it passes above the spine of the ischium. Each artery crosses the ischiorectal fossae obliquely and divides into smaller branches which are distributed to the levator ani, internal and external sphincter muscles and anal canal. The terminal branches anastomose with the middle and superior hemorrhoidal and the corresponding vessels of the opposite side.

Discussion of Blood Supply Pertinent to Special Types of Resection

The arterial pattern of the colon has been a fundamental factor in determining the types of surgical procedures which can be successfully applied to this segment of the intestinal tract. In the surgery of the sigmoid and rectum the configuration of the arteries supplying these areas has been a particularly important consideration. As previously reported,[14] Dr. C. H. Smith and the author have found it expedient to correlate the design of the arterial supply of the sigmoid and upper rectum with the technic of abdominoperineal proctosigmoidectomy without colostomy and with preservation of the sphincter mechanism as well as the technic of immediate reestablishment of bowel continuity. Moreover, Sunderland[13a] has recently added significantly to the many important studies of the arteries to the distal colon.

In the development of the present technic of abdominoperineal proctosigmoidectomy, extensive precautions have been taken to insure the viability of that portion of the colon which is brought down to the perineum. The feasibility of the operation was first established in animals. In 71 cadavers the vascular supply of the colon and rectum and the mobilization and transplantation of the viable bowel to the anus were proven to be practicable.[13] In every operative case the pattern of the inferior mesenteric artery and its branches was noted by transillumination before any vessels were ligated. The arterial supply to the segment of the bowel to be transplanted to the anus was observed by the same means after ligation of the inferior mesenteric artery. The distal point of viability was marked with a black silk suture which facilitated its identification during the perineal phase of the operation. The distal point of viability was brought 7 cm. outside the anus. Viability was further assured by incising small vessels in the mesentery of the bowel and noting free bleeding.

This experience with abdominoperineal

tions which arise below the subcutaneous external sphincter usually extend posteriorly into the subcutaneous tissues of the superficial triangular space e g , in chronic fissure and cryptitis" Whereas infections in this area do not customarily extend to adjacent ischiorectal fossae infections which have their origin above the subcutaneous bundle of the external sphincter frequently invade the deep space posteriorly and may readily extend into the ischiorectal fossae

hemorrhoidal In other words, the superior hemorrhoidal artery is continuous with, and is the terminal branch of, the inferior mesenteric In its downward course, the inferior mesenteric gives rise to the left colic and sigmoidal branches The sigmoidal

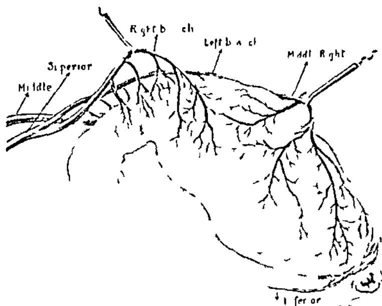


FIG 32 Dissection of the arterial supply of the rectum, the rectum dilated by means of a balloon Distribution of the superior hemorrhoidal artery and its branches (Tashian)

arteries vary in number and form a series of arcades the upper portion of which anastomoses with the left colic, while the lower part joins *with a branch from the* superior hemorrhoidal

Vascular Supply

Arterial Supply to Sigmoid Colon Rectum and Anal Canal The sigmoid colon is supplied by the inferior mesenteric artery and its branches whereas the rectum derives its source from the superior, middle and inferior hemorrhoidal and middle sacral arteries

The inferior mesenteric artery originates from the left anterior surface of the aorta approximately 3 cm above its bifurcation Embedded in the two folds of the mesosigmoid, it passes downward and at the brim of the true pelvis crosses over the left common iliac artery, from which point it continues in its descent as the superior

The superior hemorrhoidal artery which, as has been mentioned is the direct continuation of the inferior mesenteric descends on the posterior surface of the rectum and at the level of the third sacral vertebra bifurcates into two main branches the right and left superior hemorrhoidal arteries (Figs 31 32) They pass downward and forward around the sides of the rectum, in the course of which passage they divide into smaller branches and at a somewhat lower level pierce the muscular coat and continue in the submucosa as far as the anorectal line Above this numerous arterial twigs anastomose with the inferior and middle hemorrhoidal Almost all the coats of the upper rectum and the entire

statements concerning the relationship between the superior hemorrhoidal artery and the lowest sigmoidal artery less than explicit The former demonstrated that the two vessels overlap in their supply of the upper rectum but in only five of twenty five cases was there any anastomosis

In the technic of abdominoperineal sigmoidectomy with preservation of the sphincters, the last sigmoidal artery may be disregarded whether one accepts the views of Steward and Rankin or Sunderland However, the superior hemorrhoidal artery cannot be ligated below the origin of this vessel and allow sufficient mobility of the bowel to permit its being brought down

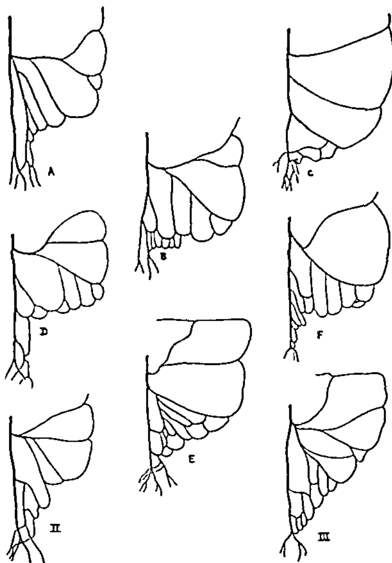


FIG 33 (A) (B) (C) (D) (E) (F) Diagrammatic representation of patterns of the inferior mesenteric artery to illustrate some of the variations observed (II) Diagrammatic representation of a pattern in which only two colic arteries were given off from the main inferior mesenteric trunk to supply the distal colon by large collateral branches (III) Vascular pattern showing the formation of multiple arcades In this specimen the lowest colic branch anastomosed with the left superior hemorrhoidal artery (Redrawn from Sunderland C H Smith and H E Bacon Ann Surg 127 28)

proctosigmoidectomy with preservation of the sphincter mechanism in over 400 cases may be considered to have been a method of study of the arteries to the sigmoid and upper rectum. As such, it can be integrated with the experimental anatomic studies.

Sudeck[133] in 1907, found that the vessels of the rectum became filled with injected material from the inferior mesenteric artery by traversing the marginal artery when a ligature was placed on the superior hemorrhoidal artery above the origin of the last branch to the sigmoid. If the ligature was placed below the origin of the lowest sigmoidal artery, few, if any, of the rectal vessels filled. In maintaining adequate blood flow to the rectum when the superior hemorrhoidal artery had to be ligated, the origin of the lowest sigmoidal artery became known as the critical point of Sudeck. Two years later Hartmann[41] corroborated Sudeck's findings and remarked that in the perineal excision of the rectum with transplantation of viable bowel to the perineum, the superior hemorrhoidal artery must be ligated high on the common trunk above the last anastomotic loop. He further commented that this ligation could only be performed through an abdominal approach. Sunderland[134] pointed out that, in the illustration used by Hartmann, the lowest sigmoidal artery was not shown and that the point of ligation indicated by Hartmann was quite high on the inferior mesenteric artery. Archibald[6] in 1908, demonstrated by animal experiments and postmortem dissections the significance of the marginal artery and proved to his satisfaction that the rectum and pelvic colon could be resected and viable iliac colon successfully brought down to the anus. Rubesch,[110] in 1910, also using an injection method found that the lowest sigmoidal artery, the sigmoid ima, may arise from the superior hemorrhoidal after it has bifurcated. Thus, the critical point may vary from 13 to 20 cm. from the anus. Drummond[32] in 1914, studied roentgenologically the injected inferior mesenteric artery in 20 specimens. In 40 per cent of the cases the last sigmoidal artery and its proximal anastomosis were insignificant, and in another 20 per cent of the cases the artery was not even present.

Stewart and Rankin,[123] on the basis of an extensive study of 100 injected specimens, described a gap in the bowel between the termination of the marginal artery and the bifurcation of the superior hemorrhoidal artery. This segment was found to be supplied by from one to five small arteries which arose from the superior hemorrhoidal artery and which varied in size and number with other anatomic variations in this region, that is, a high, low or absent last sigmoidal artery or a low bifurcation of the superior hemorrhoidal artery.

Sunderland[131] dissected the arteries to the distal colon in 20 specimens and studied the injected arteries of five additional specimens radiologically. The fact that he used dissection as well as the injection method, which results may be open to question,[108] may account for the variation between his studies and those of other workers. The number of sigmoidal arteries was found by Sunderland to vary from one to seven. They did not form any definite or constant pattern. Our operative experience has been similar. The configuration of the inferior mesenteric artery and its branches must be determined in each case by transillumination of the mesosigmoid. Only in this way can the proper point for ligation be established consistently. Thus, on the basis of studies of cases at operation, we have confirmed the recommendation of both Sudeck and Hartmann that it is wise in each patient to observe the arterial pattern of the inferior mesenteric artery and its branches. When present, the lowest sigmoidal artery was found by Sunderland to descend vertically to the sigmoid and supply the upper portion of the rectum which is also supplied by the superior hemorrhoidal artery. This is at variance with the findings of Stewart and Rankin which have been stated previously. Sunderland found Drummond's

ternal or inferior, hemorrhoidal plexus located outside the muscular layer (Fig 35)

The internal, or superior hemorrhoidal plexus begins as a group of venous sacs above the anorectal line and in the submucosa These numerous sacs freely communicate with each other and form a network known as the internal hemorrhoidal plexus which for the most part drains the mucosa of the rectum proper From this network larger veins are formed which assume considerable size and continue upward in the submucosa with their corresponding arteries until they reach the middle of the rectum where they perforate the muscular coat The veins unite on the external surface of the rectum to form the superior hemorrhoidal veins which pass upward and backward and continue onward as the inferior mesenteric vein which empties into the splenic vein or occasionally in the angle of union of the splenic and superior mesenteric veins (portal circulation) Reuther[11] in his excellent dissections has shown that the central ends of the middle and inferior hemorrhoidal veins are protected by competent valves

The external, or inferior, hemorrhoidal plexus originates as a group of small venules for the most part below the

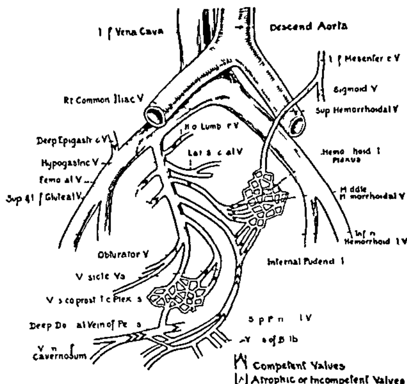


Fig 34 Diagram of pelvic veins showing competent and incompetent valves (I F Reuther Am J Surg 49 326)

anorectal line and surrounding the anal canal These anastomose with the subcutaneous veins and those located on the outer surface of the external sphincter muscle to form the external hemorrhoidal plexus Also joining this plexus are branches from the outer surface of the rectum and levator ani Two large veins are formed from this plexus (a) the inferior hemorrhoidal which is made up of veins from the lower portion of the plexus and empties into the internal pudendal vein and (b) the middle hemorrhoidal which consists of veins from the midportion of the plexus and empties into the hypogastric vein[90] Another vein of smaller size is the middle sacral which having received branches from the lateral sacral, is connected with the upper portion

to the anus without tension As a corollary, it is impossible in performing this operation to clamp the superior hemorrhoidal artery at the critical point of Sudeck

Sunderland discovered that there was a well marked anastomosis with a continuous vascular arcade (marginal artery of Drummond) between all sigmoidal arteries He remarked however, that his findings disagreed with those of Drummond, who found the lowest sigmoidal artery and its proximal anastomosis to be insignificant in 40 per cent of the cases and the artery to be absent in another 20 per cent of the cases In view of this discrepancy Sunderland believed it prudent to ligate the inferior mesenteric artery at a level higher than that between the lowest two sigmoidal arteries there has been general agreement regarding the competency of the arterial anastomosis above this level In our operative experience we have been able to segregate those cases in which ligation may be made safely between the lowest two sigmoidal arteries from those in which ligation must be performed higher than the second lowest sigmoidal artery to assure viability by the simple precautions previously described Chief among those measures has been transillumination of the mesosigmoidal before and after ligation of the inferior mesenteric artery

Sudeck s critical point has been shown to vary with the individual pattern of the arteries to the lower sigmoid It varies with the type of surgical procedure to be performed In the Miles type of operation viable bowel must be brought out as an abdominal colostomy As shown by Singleton,[1 3] this should present no difficulty when the inferior mesenteric artery is ligated above the lowest sigmoidal branch On the basis of the anatomic studies which have been described, if there is doubt regarding the adequacy of the blood supply to the colostomy loop, ligation need only be done above the second sigmoidal artery to insure sufficient blood flow

Drummond stated that where a permanent colostomy is done, the inferior mesenteric artery may be ligated just below the origin of the left colic artery In an end to end anastomosis following resection of the sigmoid, viability of each end must be assured It is in this operation that the critical point is most significant, indeed, a hypothetical situation could arise in which the radicalism of the resection might be compromised to attain viability of the bowel ends

As has been shown, in performing abdominoperineal proctosigmoidectomy with preservation of the sphincter mechanism the critical point of Sudeck need hardly be considered Ligation of the inferior mesenteric artery must be performed above the lowest sigmoidal artery, at least, to permit the mobility of the colon necessary to bring it to the anus Furthermore, the inferior mesenteric artery is deliberately ligated more proximally to insure removal of the upward lymphatic pathway and to insure the competency of the circulation to that portion of the bowel to be brought to the anus In the average case, we have agreed with Drummond[33] that the most satisfactory place to ligate the inferior mesenteric artery is immediately below the first sigmoidal branch which can be recognized by the large anastomotic branch it forms with the left colic artery

In selected cases of polyposis, ulcerative colitis diverticulitis and lymphogranuloma venereum the rectum sigmoid, descending colon splenic flexure and a portion of the transverse colon have been extirpated In these cases, the inferior mesenteric artery has been ligated and the stump of transverse colon has been brought down to the anus Viability has been maintained by the middle colic artery Eight of eleven patients on whom this operation was performed have been reported[1] See Chapter 21

Venous Supply The veins of the rectum and anus may be considered as a huge hemorrhoidal plexus which consists of two parts (1) an internal or superior hemorrhoidal plexus situated in the submucosa above the anorectal line, and (2) an ex

ternal, or inferior, hemorrhoidal plexus located outside the muscular layer (Fig 35)

THE INTERNAL, OR SUPERIOR, HEMORRHOIDAL PLEXUS begins as a group of venous sacs above the anorectal line and in the submucosa These numerous sacs freely communicate with each other and form a network known as the internal hemorrhoidal plexus which for the most part drains the mucosa of the rectum proper From this network larger veins are formed which assume considerable size and continue upward in the submucosa with their corresponding arteries until they reach the middle of the rectum where they perforate the muscular coat The veins unite on the external surface of the rectum to form the superior hemorrhoidal veins which pass upward and backward and continue onward as the inferior mesenteric vein which empties into the splenic vein or occasionally in the angle of union of the splenic and superior mesenteric veins (portal circulation) Reuther[11] in his excellent dissections has shown that the central ends of the middle and inferior hemorrhoidal veins are protected by competent valves

FIG 34 Diagram of pelvic veins showing competent and incompetent valves (T F Reuther Am J Surg 49 326)

THE EXTERNAL, OR INFERIOR, HEMORRHOIDAL PLEXUS originates as a group of small venules for the most part below the anorectal line and surrounding the anal canal These anastomose with the subcutaneous veins and those located on the outer surface of the external sphincter muscle to form the external hemorrhoidal plexus Also joining this plexus are branches from the outer surface of the rectum and levator ani Two large veins are formed from this plexus (a) the inferior hemorrhoidal which is made up of veins from the lower portion of the plexus and empties into the internal pudendal vein and (b) the middle hemorrhoidal which consists of veins from the midportion of the plexus and empties into the hypogastric vein[99] Another vein of smaller size is the middle sacral, which having received branches from the lateral sacral is connected with the upper portion

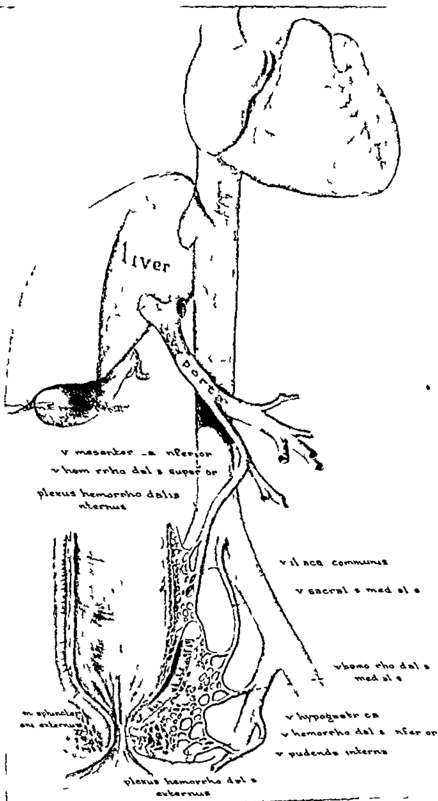


Fig 35 Venous drainage of the rectum and anus showing the superior or internal and the inferior or external hemorrhoidal plexuses

of this plexus, from which it passes to empty into the left common iliac vein It will be seen from this description that the internal hemorrhoidal plexus drains into what is known as the portal circulation and the external hemorrhoidal plexus into the caval circulation



Fig 36 Lymphatics of the rectum showing the two intramural the intermediate and extramural network The upper rectum sigmoid and part of the peritoneum have been excised to show some of the aortic glands Two glands are noted at the bifurcation of the common iliac (upper mesocolic)

Lymphatics

The lymphatics* of the anus and rectum which consist of lymph capillaries lymph vessels and lymph glands or nodes, may be simply divided into two main groups one situated below the anorectal line (inferior group) which drains the lymph from the anal canal and empties into the inguinal lymphatics, and another above the ano rectal line (superior group) which drains the lymph from the rectum and finally empties into the median lumbar glands (See mode of spread Chap 19 Malignancy pp 646 647)

The superior group of lymphatics of the rectum may be described as consisting

* Based on the dissections of the author[8] with especial reference to Paitre[97] Rouviere[117] Miles[86, 87] and Poirier[102, 103, 104] as well as others[101, 107, 144]

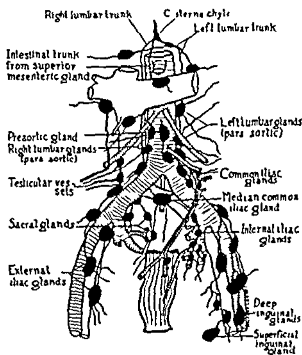


Fig 37 Diagram of lymph vessels and glands of posterior abdominal wall and pelvis (W W Looney Am J Surg 46 143)

of three networks (1) An intramural, made up of (a) a submucous network located in the submucosa of the rectum, and (b) an intermuscular, situated between the circular and longitudinal muscle layers of the rectum (2) An intermediate, consisting of (a) a subserous network situated in that portion of the rectum which is covered by peritoneum, and (b) the lymph sinus network lying between the rectum and the perirectal fascia and which is uncovered by peritoneum and (3) an extramural network lying outside the rectal wall (Fig 36) Thus the lymph from the intramural network is drained by the lymph sinus of the intermediate group, which in turn is drained by the most important group, the extramural The efferents from this group pass upward and backward and, with the glands of Gerota [40] which are four to seven in number, form an extensive plexus scattered over the outside of the rectum From this point the lymph may pass in three ways, namely, (1) upward (2) laterally, or (3) downward It may pass (1) upward to the retrorectal (lower mesocolic) or sacral glands, located in the concavity of the sacrum then to the upper mesocolic glands, situated at the bifurcation of the left common iliac, and thence, finally, to the median lumbar (aortic, composed of left and right lateral preaortic and retroaortic) glands this also receives tributaries from the sigmoid It may pass (2) laterally to a small group of nodes on the superior surface of the levator ani muscle which pass to the obturator glands and then into the internal iliac glands Finally, it may pass (3) downward, passing through the fat in the ischiorectal fossa to join a small group of glands which after perforating the levator ani

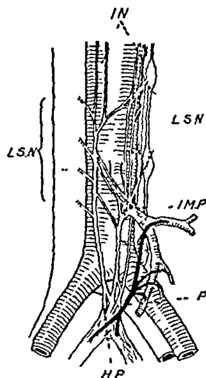


Fig 38 Diagram of lumbar sympathetic and pelvic parasympathetic systems (I N) Intermesenteric nerves (L S N) Lumbar splanchnic nerves (I M P) Inferior mesenteric plexus and ganglion (P) Parasympathetic fibers to distal colon and rectum (H P) Hypogastric plexus (superior portion) i e presacral nerve (E D Telford and J S Stopford Brit M J 2 770)

muscle, also empty into the internal iliac glands

The inferior group consists of a network about the external sphincter muscle and a subcutaneous network under the anal and perianal skin Although these communicate above with the superior group especially through the intramural chain, the lymph passes for the most part through the perineum to the inguinal lymphatics Nesselrod[91] has properly emphasized that definite anastomoses exist between the lymphatics of the anal canal and rectum Too he noted from his dissections that in the female the lymphatic drainage from the vagina and cervix is pelvic This is a point well to be remembered in vaginoperineal extirpation

Nerve Supply

Sigmoid Colon and Rectum The sigmoid colon and rectum derive their innervation from the visceral portion of the nervous system, both afferent and efferent (sympathetic and parasympathetic)—whereas the anal canal and perianal area receive their innervation from the somatic portion of the nervous system (cerebrospinal) (Fig 39) Thus it can be readily understood why the sigmoid colon and rectum are insensitive to pain The junction of the rectum and anal canal or anorectal line, represents rather a sharp demarcation between these two systems, namely—the visceral above and the somatic below and just as sensitivity decreases from the ano

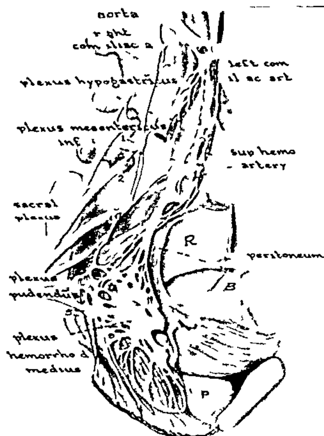


Fig 39 Innervation of the sigmoid colon and rectum showing the visceral parasympathetic and sympathetic fibers The visceral sympathetic fibers can be seen accompanying the superior hemorrhoidal artery to a point behind the rectum

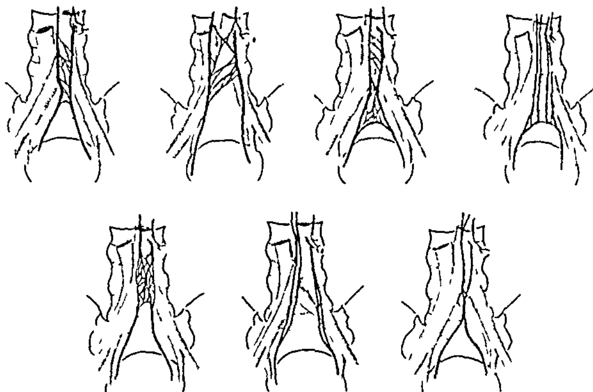


Fig 40 Diagrammatic representation of the types of superior hypogastric plexus which may be found (J S Labate Surg, Gynec & Obst 67 199)

rectal line upward, it increases from this line downward The visceral sympathetic fibers are derived from two sources (a) by way of the inferior mesenteric plexus through its superior hemorrhoidal branches these are two or three in number, and, as they accompany the superior hemorrhoidal vessels, invest the posterior and lateral aspects of the rectum (b) from fibers of the two pelvic plexuses which follow the middle hemorrhoidal vessels these fibers in the two pelvic plexuses are derived from the hypogastric plexus which is located in front of the last lumbar vertebra and the sacral portion of the sympathetic trunk The fibers —namely (a) and (b)—are distributed to the mucous membrane of the rectum the muscular coat, and the internal sphincter muscle The parasympathetic visceral fibers come by way of visceral branches of the ventral roots of the second third and fourth sacral nerves[60 135] After joining the inferior mesenteric plexus at a point approximately one and one half inches from the origin of the inferior mesenteric artery, these fibers extend and distribute branches along the left colic artery As the nerve trunk passes over the left common iliac artery, it distributes branches to accompany the sigmoidal and superior hemorrhoidal arteries and to the pelvic viscera In its course it is joined by sympathetics from the hypogastric plexus These fibers convey both motor and inhibitory impulses to the musculature of the colon and rectum

The Internal Sphincter The innervation of the internal sphincter is by way of the sympathetic (thoracolumbar) fibers, which reach the sphincter by way of the inferior mesenteric nerves their superior hemorrhoidal branches and branches of the hypogastric ganglia and second by way of the presacral nerve (superior hypogastric plexus) The presacral nerve according to Latarjet[7] is essentially the superior portion of the hypogastric plexus, although

Labate[72] found it to represent a plexus rather than a single nerve or parallel nerves in 63 of 75 dissections on the adult and infant Abel[1] describes it as being definitely prelumbar and lying between the diverging common iliac arteries It begins above the bifurcation of the aorta and extends distally to the sacral promontory It lies in front of the fourth and fifth lumbar vertebrae from which it is separated above by the left common iliac vein and below by the middle sacral artery The superior hypogastric plexus courses inferiorly toward the pelvis and by dividing into two branches forms the middle hypogastric plexus, which follows the hypogastric arteries to form the inferior hypogastric plexus The latter is in relation to the middle hemorrhoidal arteries as they arise from the hypogastric artery in the lateral aspect of the pelvirectal space These two divisions of the hypogastric plexus are referred to as the left and right pelvic plexuses and supply sympathetic fibers to all the pelvic viscera They continue in their downward course and join to form a plexus in front of

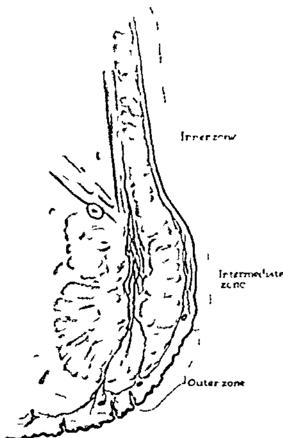


Fig 41 Diagram showing the continuous subepithelial nerve network of the rectal submucosa and the anal skin and the continuation of the intermuscular (Auerbach s) plexus supplying fibers to the external sphincter ani muscle All medullated nerves have been omitted from the diagram (Reuther T F Tr Am Proc Soc p 204 1940)

the coccyx Between the circular and longitudinal coats of the rectum, there is a well developed intermuscular plexus (Auerbach) which sends nerve fibers through the circular layer to the submucosa where it forms a second plexus (Meissner) known as the submucous plexus These fibers are nonmedullated The painstaking investigations of Reuther[110] demonstrate that the intermuscular plexus of Auerbach does not end abruptly at the lower end of the internal sphincter muscle but continues outward in its downward course toward the skin and gives off branches to the external sphincter muscle The fibers of the inferior mesenteric plexus end in the musculature of the colon and rectum, and inhibit its activity The motor control of the internal sphincter is supplied by the sympathetic (thoracolumbar outflow)[3]

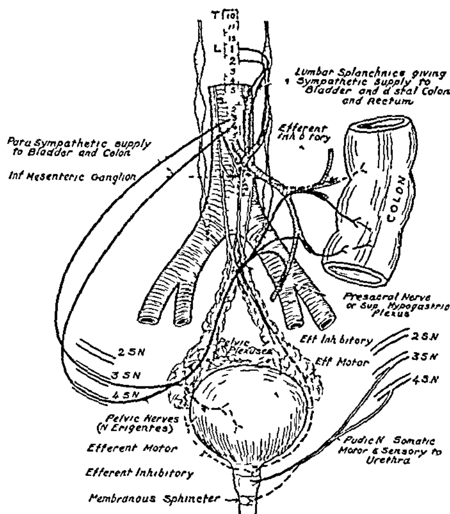


Fig 42 Diagram of the parasympathetic innervation to the rectum (A L Abel)

Anal Canal This, the terminal portion of the intestinal tube, receives its innervation from the somatic portion of the nervous system (cerebrospinal) through the pudendal nerve (internal pudic nerve, ventral branches of the second, third and fourth sacral nerves)[9] Before dividing into its two terminal branches the pudendal (internal pudic) gives off the inferior hemorrhoidal nerve, although it may arise directly from the sacral plexus (Fig 43) This nerve traverses the ischiorectal fossa in company with the inferior hemorrhoidal vessels and is distributed to the external sphincter

muscle, the modified skin lining the anal canal, and a portion of the perianal area These fibers are medullated until their ultimate distribution, where they lose their myelin sheaths to become nonmedullated nonmedullated nerves of the Auberbach plexus[110] According to Hiller[18] the external sphincter muscle receives innervation in each of its four quadrants (Fig 43) A small filament derived from the pudendal

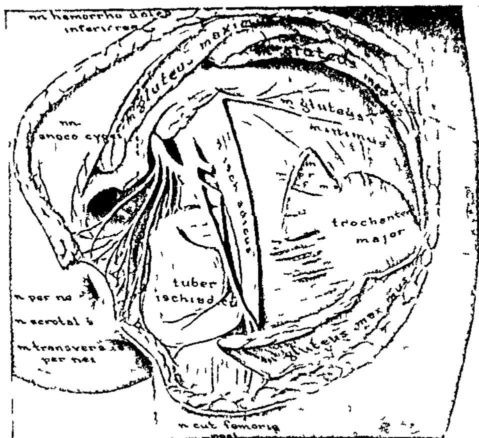


Fig 43 Hemilateral view showing branches of the inferior hemorrhoidal perineal and anococcygeal nerves as they pass to the anal and perianal region

Reuther[110] has shown that, in addition to the cerebrospinal nerves or subepithelial plexus mentioned above a second plexus exists with which it is continuous He found pacinian corpuscles outside the longitudinal muscle at the lower end of the rectum and supporting cells which bear the name corpuscles of Krause, or anogenital corpuscles

The external sphincter muscle receives its innervation from the second third and fourth sacral nerves through the inferior hemorrhoidal nerves These nerves enter the muscle at approximately a right angle to the direction of its fibers Additional innervation is derived from the (internal pudic) before its division into terminal branches is designated by Tuttle as the anterior sphincterian nerve, since it supplies the anterior portion of this muscle Morestin[91] describes a filament derived from the fifth sacral and coccygeal nerves and distributed to the posterior superficial surface of the external sphincter muscle This he calls the lesser sphincterian nerve

The levator ani muscle derives its nerve supply by a branch from the fourth sacral nerve and by a branch which may be derived either from the inferior hemorrhoidal or the perineal nerve

Perianal Area This region is supplied

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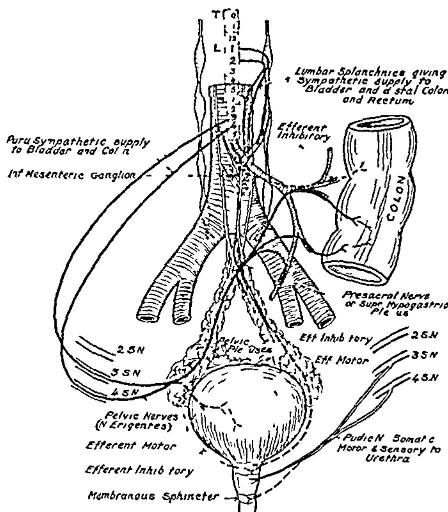


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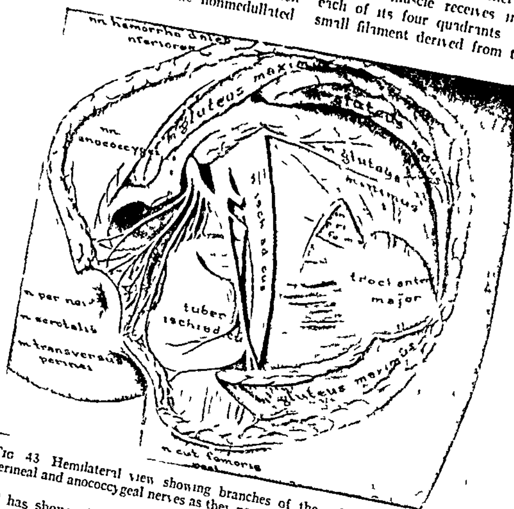


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THE EXTERNAL SPHINCTER muscle receives its innervation from the second third and fourth sacral nerves through the inferior hemorrhoidal nerves These nerves enter the muscle at approximately a right angle to the direction of its fibers Additional innervation is derived from the nonmedullated nerves of the Auberbach plexus[110] According to Hiller[44] the external sphincter muscle receives innervation in each of its four quadrants (Fig 43) A small filament derived from the pudendal (internal pudic) before its division into terminal branches is designated by Tuttle as the anterior sphincterian nerve, since it supplies the anterior portion of this muscle Morestin[91] describes a filament derived from the fifth sacral and coccygeal nerves and distributed to the posterior superficial surface of the external sphincter muscle This he calls the lesser sphincterian nerve

THE LEVATOR ANI MUSCLE derives its nerve supply by a branch from the fourth sacral nerve and by a branch which may be derived either from the inferior hemorrhoidal or the perineal nerve

Perianal Area This region

by branches derived from the dorsal nerve roots of the first, second, third and fourth sacral and the first coccygeal segments[90] This last also receives a branch from the fifth sacral The inferior hemorrhoidal nerve is distributed to the posterolateral aspect of the perianal area, whereas the perineal nerve, which is one of the terminal branches of the pudendal nerve (internal pudic), supplies the lateral portion and its posterior scrotal branches supply the skin of the anterior perineum and scrotum The posterior femoral cutaneous nerve which arises from the posterior division of the second and third sacral nerves, distributes branches to the perineum also The ano coccygeal nerves which take origin from the coccygeal plexus and which are formed by the union of the coccygeal, the fifth sacral and a communicating filament from the fourth sacral nerves, are distributed to the skin in the region of the coccyx

Surgical Importance The abundant nerve supply to the anal canal accounts for its marked sensitivity and for the fact that irritations and operative procedures in this area are usually associated with considerable pain As has been shown the nerves that supply the lining of the anal canal also send branches to the external sphincter and levator ani muscles Thus the peripheral irritation is often followed by a reflex contraction of these muscles and when it affects the former it is termed 'sphincter spasm' or 'sphincterismus' Because of the intimate association of these nerves, disturbances of the genito urinary system (bladder, prostate urethra uterus and vagina) in the form of dysuria anuria and menstrual disorders and of the upper intestine, as indigestion and flatulence are not uncommon By the same token various reflex phenomena may occur to the lumbo sacral region crests of the ilium the thigh and calves of the leg[80] Thiele[138] groups the reflex symptoms from the anus and rectum as follows (1) sympathetic stimulation of which produces gastro intestinal relaxation, sphincteric contraction and glandular hyposecretions, (2) parasympathetic, stimulation of which causes gastro intestinal contraction, sphincteric relaxation and glandular hypersecretion, (3) cerebro spinal, stimulation of which brings about such symptoms as lumbar and sacral aching, sciatica, etc, and (4) combinations of the above, from which may result the syndrome of neurasthenia

HISTOLOGY

Anal Canal

The anal canal is lined by both true and modified skin The term modified skin is used because it does not possess entirely the characteristics of true skin in its full length, namely, sebaceous glands, sweat glands, hair follicles and cornification

Modified Anal Skin As in other parts where skin is present, this modified anal skin consists of two layers, (a) epidermis and (b) corium, each of which has two or more layers (a) The epithelium is of the stratified squamous variety (Fig 47) The cells are closely arranged in from 15 to 20 layers, but near the anorectal line these dwindle to four or five layers The stratum corneum which is the outer or superficial layer, is hard and horny in character, the cells are large, flat and the nuclei very distinct Internally is the stratum lucidum and, beneath this the stratum granulosum The latter is thick and the cells are deeply stained More internally is the stratum Malpighii composed of many layers of polygonal cells which make up a thicker layer than the skin of the perianal region (true skin) The nuclei of these cells are small and irregular and the protoplasm is faintly stained The basal cells have oval nuclei and stain deeply Dermal papillae are present in this area Beneath these layers is (b) the corium or true skin which consists of the pars papillaris composed of delicate bundles of white fibrous and elastic connective tissues and the pars reticularis composed of coarser bundles of white fibrous and yellow elastic tissues

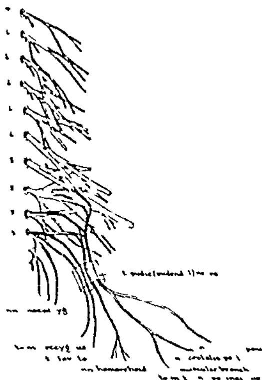


Fig 44 Nerves to the anorectal area showing their origin in the sacro pudendal plexus (Bacon Surg Gynec & Obst 66 105)



Fig 45 Perineal nerve distribution (female) (A) Perineal nerve (B) Pudendal nerve (C) Anterior sphincterian nerve (D) Inferior hemorrhoidal branch (E) Fourth sacral nerve (F) Coccygeal branches (R Gorsch)

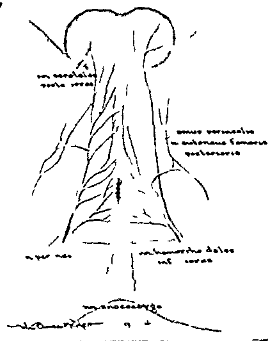


Fig 46 Distribution and location of sensory nerves of the anal region. (Bacon Surg Gynec & Obst 66 105)



Fig 47 Photomicrograph of anorectal line Low power At the top and on the left the dark thickened area (squamous layer) can be seen diminishing in thickness to end abruptly at the anorectal line Beyond or to the right is the mucosa with its characteristic glands

True Skin The modified anal skin above described is continuous below with the true skin which lines the lower one third of the anal canal and is continuous over the perianal region (Fig 48) The transition of the modified skin into the true skin is gradual[11, 8] Below this line of transition, cornification sweat or sudoriferous glands sebaceous glands and hair follicles are present Two varieties of sudoriferous glands are encountered, the ordinary type or eccrine and the apocrine The latter are found deep in the dermis and only where hair exists or has existed As has been shown,[7, 146] the apocrine variety contain more protein and fat than the eccrine type and lead in secreting cholesterol Occurring more frequently in the female sex they decrease numerically in old age and enlarge during pregnancy Apparently these glands do not function until sexual activity is manifested, when secretion occurs Both Brinkman and Richter[113] consider them true accessory sexual glands Tumors (hidradenoma) arising from the anal apocrine glands have been reported[3, 100]

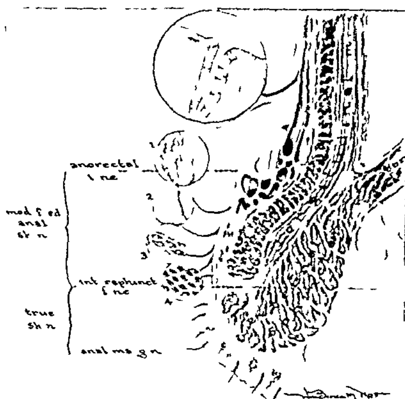


Fig 48 Sagittal section of the lower rectum and anal canal showing the microscopic picture at various levels

The site of transition between the modified skin above and the true skin below corresponds to the intermuscular septum or the intersphincteric line

Anorectal Line This represents the abrupt transition from the mucous membrane with its characteristic tubular glands, and with goblet and columnar cells above to the modified anal skin with its characteristic stratified squamous cells below (Fig 49) This point of union is also referred to as the pecten, the dentate, or pectinate line The terms anocutaneous, rectocutaneous and mucocutaneous are misleading and should be omitted from the nomenclature At the junction of the anal canal and rectum (anorectal line) are the crypts of Morgagni In addition to the description of Pennington[89] and Herrmann[4] Lewis and Bremer[74] represent the glands in this region as follows in the lower part of the zona columnaris arising from the

rectal sinuses there are a few branched, tubular, glandlike structures, the intramuscular glands These are seldom more than six or eight the main ducts of these glands extend outward and usually downward, and penetrate the internal circular muscle (internal sphincter) Here a flask shaped swelling is usually encountered Extending beyond this ampulla there are several tubular branches which continue through the internal sphincter and end blindly in the intramuscular connective tissue The epithelium lining the main ducts of these glands consists of several layers of polygonal cells but the ampullae and branches are lined with one or two layers of cuboidal cells Secretory cells are present in the embryo and at birth but are apparently wanting in the adult The observations of Tucker and Hellwig[11] demonstrated the presence of well-developed glandular structures emptying into the mouths of the crypts of Morgagni (Fig 50) These tubular ducts which they consider to be secretory in function, extended into the submucosa in a branching fashion and were lined for a variable length by epithelium That portion emptying into the mouth of the crypt of Morgagni was lined by stratified squamous cells while at a more distal portion the cells changed to a simple columnar variety Besides confirming the above findings Pope[10] demonstrated that a truly acinar structure may be present Both authors consider that the course of a fistulous tract may be dependent on the course location and extent of these branching tubular glands (Figs 51 52)



Fig 49 Photomicrograph of anorectal line High power showing the abrupt cessation of the squamous cells as they approach the mucosa



Fig 50 (*Left*) Branching and duct opening into crypt of Morgagni (C C Tucker and C A Hellwig Tr Am Proc Soc 34 47)

Fig 51 (*Right*) Branching tubular glands Low power (C E Pope Tr Am Proc Soc 34 51)

Rectum and Sigmoid Colon

The layers from within out are

Mucous membrane {a epithelium; b basement membrane; c tunica propria; d muscularis mucosa {inner circular; outer longitudinal}}
Submucosa
Muscular layer
Serous or peritoneal layer

The mucous membrane of the sigmoid and rectum is not unlike the remainder of the large bowel Pale pink in color smooth and devoid of villi it is raised into numerous crescentic folds which correspond to the intervals between the sacculi

Mucous Membrane The glands of the epithelium (glands of Lieberkuhn) are somewhat elongated regularly and vertically arranged (Fig 53) They are of the tubular type, and at right angles to the lumen of the bowel The cells are of the tall, columnar type, in each of which a single nucleus is basically placed Scattered between this cellular layer are goblet cells so called because they assume the shape of a goblet upon absorption of water These cells contain mucinogen (mother substance) which makes its appearance in the form of granules When secretion occurs these granules absorb water, swell and coalesce to form mucin a colloidal protein[8] At the junction of the rectum with the anal canal, *the simple columnar cells of the former* change abruptly to the stratified squamous cells of the latter Our observations have shown that the cells of the columns of Morgagni are sometimes of the stratified *columnar type for a variable height* The mucosa is somewhat irregular and presents normally three transverse or oblique folds known as the valves of Houston These are composed of mucosa beneath which is the submucosa Arteries veins and lymphatics are noted at the base of the submucosa, near the wall of the rectum A small amount of involuntary nonstriated muscle fibers are discernible which may be traced to the circular layer in the surrounding wall No longitudinal muscle fibers are visible on section



Fig 52 Anal duct in region of anorectal line

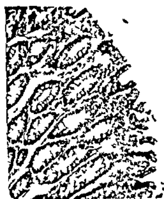


Fig 53 Glands of Lieberkuhn of the rectal mucosa

The basement membrane consists of a thin, homogeneous layer of flat cells beneath which is c, the tunica propria made up of fibrous elastic tissue Below this is d the muscularis mucosa consisting of inner cir*cular and outer longitudinal smooth muscle* fibers

Submucosa The submucosa or submu*cous* coat forms the bed upon which the

mucosa rests and because of its loose attachment to the latter, permits the mucosa to glide easily over it. The submucosa is formed of white, fibrous connective tissue, loosely arranged to permit greater mobility and distensibility, and containing ramifications of blood vessels, nerves and lymphatics.

Muscular Layer. The muscular coat consists of an outer longitudinal and an inner circular layer of nonstriped muscle fibers. The longitudinal muscle fibers in the colon are collected into three flat longitudinal bands (taenia coli) each approximately 12 mm in width. These bands are shorter than the other coats of the intestine and serve to produce the sacculi which are characteristic of the colon. In the sigmoid these longitudinal fibers are more scattered and spread out around the rectum to form a layer which completely encircles this portion of the gut. In the vicinity of the anorectal junction, the fibers of the longitudinal coat become somewhat fibro elastic and fuse with the levator ani muscles and their fascial reflections to form the conjoined longitudinal muscle. The circular muscle fibers form a thin layer in the sigmoid which is thick in the rectum. As they approach the anus their muscular component is increased to constitute the internal sphincter.

Serous or Peritoneal Layer. The serous or peritoneal coat invests the entire sigmoid colon. Laterally, the peritoneal folds are reflected diagnoally upward and backward to form the pararectal fossa and the leaves of the sigmoid and mesorectum. Along the entire sigmoid the peritoneal layer is thrown into numerous small appendages which are pouches filled with fat and known as the appendices epiploicae. However, the serous or peritoneal coat is found only on the anterior and lateral surfaces of the upper two thirds of the rectum. As seen in Figure 55, the sagittal section shows the reflection to be oblique from its posterior aspect opposite the third sacral vertebra where it meets its fellow of the opposite side to form the pelvic mesocolon or mesorectum to its anterior surface. From this point the peritoneum is reflected in the male, to the bladder forming the rectovesical pouch and in the female to the posterior vaginal wall and uterus, forming the recto uterine pouch or cul-de sac of Douglas. Therefore the rectum is devoid of peritoneum below the reflection but is encased in a dense layer, the fascia propria, which is continuous with and part of the pelvic fascia (See p. 15.) The pouch formed by the reflection of peritoneum between the rectum and bladder in the male, or rectum and vagina in the female, is of importance in that metastatic growths from the pancreas, gall bladder, ascending colon, kidney, breast, esophagus and especially the stomach are found in this site. It is commonly referred to as Blumer's rectal shelf.[12, 14 ...] First described by Hermann Strauss in 1895, some 41 cases have been reported to which is added a series of 46 proved cases observed by the writer.[9, 14] (See ... Malignancy.)

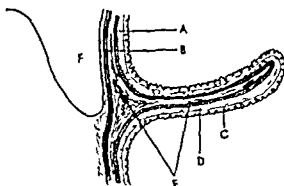


Fig. 54. Longitudinal section of the rectal valve (schematic). Note the accentuation of the circular muscle fibers and the rather dense fibro areolar reticulum at the base of the valve. (A) Circular muscle. (B) Longitudinal muscle. (C) Mucosa. (D) Submucosa. (F) Fibro areolar tissue. (E) Cul de sac. (R. Gorsch.)

PHYSIOLOGY

Essentially the function of the ... to excrete the ... descending and ...

Rectum and Sigmoid Colon

The layers from within out are

- Mucous membrane
  - a epithelium
  - b basement membrane
  - c *tunica propria*
  - d muscularis mucosa
    - *inner circular*
    - outer longitudinal
- Submucosa
- Muscular layer
- Serous or peritoneal layer

The mucous membrane of the sigmoid and rectum is not unlike the remainder of the large bowel Pale pink in color smooth and devoid of villi it is raised into numerous crescentic folds which correspond to the intervals between the sacculi

Mucous Membrane The *glands of the* epithelium (glands of Lieberkuhn) are somewhat elongated, regularly and vertically arranged (Fig 53) They are of the tubular type, and at right angles to the lumen of the bowel The cells are of the tall, columnar type, in each of which a single nucleus is basically placed Scattered between this cellular layer are goblet cells *so called because they assume the shape of* a goblet upon absorption of water These cells contain mucinogen (mother substance) which makes its appearance in the form of granules When secretion occurs these granules absorb water, swell and coalesce to form mucin a colloidal protein[6] At the *junction of the rectum with the anal* canal, the simple columnar cells of the former change abruptly to the stratified squamous cells of the latter Our observations have shown that the cells of the columns of Morgagni are sometimes of the stratified columnar type for a variable height The mucosa is somewhat irregular and presents normally three transverse or oblique folds known as the valves of Houston These are composed of mucosa beneath which is the submucosa Arteries veins and lymphatics are noted at the base of the submucosa, near the wall of the rectum A small amount *of involuntary nonstriated muscle fibers* are discernible which may be traced to the circular layer in the surrounding wall No longitudinal muscle fibers are visible on section



Fig 52 Anal duct in region of anorectal line

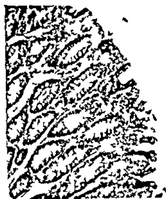


Fig 53 Glands of Lieberkuhn of the rectal mucosa

The basement membrane consists of a thin homogeneous layer of flat cells beneath which is c, the tunica propria made up of fibrous elastic tissue Below this is d the muscularis mucosa consisting of inner circular and outer longitudinal smooth muscle fibers

Submucosa The submucosa or submucous coat forms the bed upon which the

sure, which, in turn, exerts influence on the viscera, and the contents of the descending colon are forced into the pelvic and sigmoid colon The entrance of the bowel contents into the rectum causes distention and pressure at the anorectal junction, which stimulates a desire for stool If for any reason this desire is postponed or delayed, the fecal material returns into the sigmoid, and at times into the descending colon as determined by roentgenogram[4, 1, 60, 1, 16] This retroperistaltic action was also referred to by O Bierne in 1833[65] If, however the desire is not delayed and the bowel contents pass into the rectum as is normal the internal sphincter muscle (which is involuntary) is thrown into a state of tonic contraction, which relaxes when the act of defecation is begun[31] Both the internal and external sphincter muscles are in a state of tonus under normal conditions, and, together with the levator ani occlude the anal canal

The force of the tonic contraction of the internal sphincter is from 30 to 60 per cent less than that of the external sphincter, according to Howell[55] or from 35 to 40 per cent according to Mutti[81] Like the rest of the rectal musculature, the internal sphincter muscle receives both contractile (motor) and inhibitory fibers[37] Thus it may be observed that this muscle is thrown into a state of relaxation by stimulation of the pelvic nerve parasympathetic (craniosacral autonomics)—motor, and by the same token is inhibited by stimulation of the hypogastric plexus, sympathetic (thoracolumbar autonomics)

The voluntary inhibitory center is located in the brain, while the spinal ' defecatory or reflex center is situated in the cord opposite the base of the first lumbar vertebra in the tip of the cord known as the conus medullaris

The valves of Houston contain involuntary, nonstriated muscle fibers derived from the circular layer of the rectal wall The function of these valves is to impart a rotary motion to the feces and to consolidate them[7]

As cited in the foregoing the external sphincter and levator ani muscles are voluntary, receiving innervation from the sacral plexus

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fluids are absorbed in this part of the intestinal tract, although digestion is nil The secretion of mucus, which is performed by the numerous goblet cells of the sigmoid and rectal mucosa lubricates the passage and does much to aid in the process of defecation

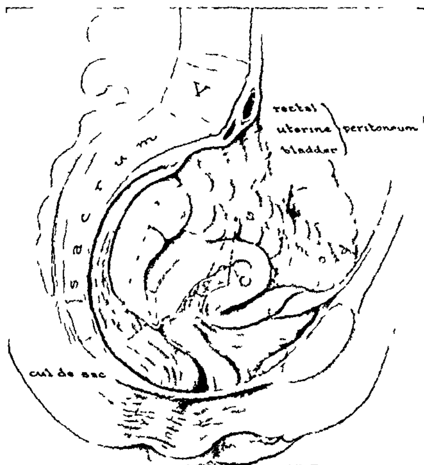


Fig 55 Illustration in the female showing the serous coat or peritoneum as it invests the rectum Its reflection from the latter onto the uterus is shown also

Defecation

The secretions from the upper intestine, together with some debris and the undigested and indigestible parts of food, finally reach the sigmoid colon and rectum Usually this fecal material is retained in the sigmoid and pelvic colon That the rectum is normally empty of feces except just prior to the act of defecation, has been determined by roentgenography Physiologically, this may be explained by the observations of Alvarez[7] and Rost,[110] who state that the tone of the rectum and sigmoid is higher than that of the proximal portion of the large bowel According to Westphal,[119] a strong circular bundle of muscle fibers is present at the lower end of the sigmoid, contraction of which hinders further passage downward As aforementioned, this so-called "third" sphincter has not been verified anatomically (See p 5)

Defecation is both a voluntary and an involuntary act The latter is brought about by the peristaltic contraction of the entire colon and rectum with some coexistent inhibition of the sphincters,[90] whereas the former or voluntary action consists of a contraction of both the diaphragm and the abdominal muscles[71] This contraction greatly increases the intra abdominal pres

sure, which, in turn, exerts influence on the viscera, and the contents of the descending colon are forced into the pelvic and sigmoid colon The entrance of the bowel contents into the rectum causes distention and pressure at the anorectal junction which stimulates a desire for stool If for any reason this desire is postponed or delayed, the fecal material returns into the sigmoid, and at times into the descending colon as determined by roentgenogram[4 1 60 1 1 0] This retroperistaltic action was also referred to by O Bierne in 1833[9] If, however the desire is not delayed and the bowel contents pass into the rectum as is normal the internal sphincter muscle (which is involuntary) is thrown into a state of tonic contraction, which relaxes when the act of defecation is begun[31] Both the internal and external sphincter muscles are in a state of tonus under normal conditions, and together with the levator ani occlude the anal canal

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CHAPTER 2

Examination and Diagnosis

GENERAL REMARKS

It is the duty of the physician to make a complete and thorough examination By some this may be considered repulsive and embarrassing to the patient yet there is no excuse for its omission It is well to bear in mind that existing pathology is overlooked through carelessness or failure of examination more frequently than through lack of knowledge of the anorectal and colonic regions

HISTORY

An accurate history is of utmost importance and should be carefully taken in each case Quite frequently symptoms considered insignificant by the patient bear influence on the case and prove of value to the physician Effort should be made to have the patient give first the chief complaint and then the various symptoms, rather than offer a diagnosis of his or her ailment as piles abscess fistula etc The physician's questions should be direct systematic and to the point so that nothing of importance will be omitted The accompanying chart designed by the late Dr Collier F Martin has proved of service for clinic and office use (Fig 56)

Previous History

In taking the history, details should be obtained regarding the following symptoms

Pain Its character whether stinging or aching, sharp or dull, intermittent or constant its mode of onset, duration, location, and relation to defecation That occurring in fissure for instance, is usually characterized by a pain interval is aggravated by stool and is lancinating, whereas the pain in protruding internal and thrombotic external hemorrhoids is frequently aching in character and more or less protracted Varying degrees of pain may be encountered in different conditions, but as a rule it may be said that any process in the anus as fissure ulcer thrombotic hemorrhoid infected crypt esthiomene and epithelioma, or protrusion through the anal canal, as internal hemorrhoids and polypoid growths will initiate sphincter spasm and cause pain When the anal skin is denuded or torn the pain is more likely to be sharp and lancinating in character Affections below the

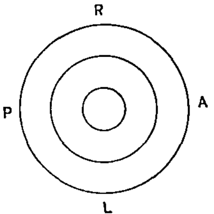
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Ab cess   When
Locat on
Const p t on
Lavatives   Enemas
D arrl oe
Duration
Stools   N mber
Cha acter   Mucus   Blood   Pus
Te e mus Cr mp
Con tant   Per odic
O gani ms
Pre ous Treatm nt

Procto cop   Ex m.
Cal b e
Distai ce
I terf e ce
F i d ngs



Result of E am nat on
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D n p e   S us
D al ge   Ha
S ll g
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Peri an l loc t on of   ea of
sea
I c en a   Ero ns
Ul er   Si ell ng
Ab c ss
Tl r n bo s   Tags
L te nal Open ngs
Anal loc t on and a ea of
Ulcers   Crypts
Pap llae
S ar   Thrombosis
F t ilo s Ope ngs
Sph ct rs
Tor e   Ataxic
C t nence
Rectum
Hemorrhoids
I ec s n ampulla
Mc osa   St ct re
Val of Houston
Abscess
F t lous Open ngs
Ne v Growths
S ze   Locat on   No.
Par rect l
Spa es
Prostate
Cerv x

Fig 56 History chart for office and clinic use (Collier F Martin)

lower third of the anus or below the lower edge of the external sphincter fibers and of the perianal skin are seldom severely aggravated by stool but do quite often cause soreness and burning Uncomplicated processes in the rectum, as internal hemorrhoids, and benign and malignant growths, do not give rise to pain unless they cause pressure One condition in which the pain is fairly characteristic is rectal and rectovaginal endometriosis Here it is always intensified during menstruation

Bleeding The duration, and whether intermittent or constant the color, whether bright or dark red or black its relation to the action of the bowels whether it oozes or spurts and if it merely streaks the stool or underclothing or is profuse Bright red blood signifies freshness, as if from some process in the anus or rectum dark red has remained within the intestine for a short period as from the sigmoid and black blood is from some site higher in the intestinal tract The bleeding in fissure and cryptitis is usually slight in amount while in internal hemorrhoids, various types of proctosigmoiditis, prolapse and procidentia, it is *often profuse In malignant growths and* inflammatory stricture the blood may be mixed with pus debris and mucus

Protrusion Its character whether soft or hard, and if associated with bleeding its constancy the relation of the protrusion to defecation if it can be replaced and in what manner spontaneously manually or with instruments For example internal hemorrhoids may protrude, in which case they are soft and boggy Such are usually described as replaceable but if strangulation has occurred there is generally considerable edema associated the mass is more uniform and is not replaceable Polypoid growths and hypertrophied anal papillae are of firmer consistency Prolapse and procidentia are more or less uniform the latter presenting greater thickness and usually greater length

Discharge The character, whether mucus or pus and if mixed with blood feces and debris, its source, if from an opening beside the anal aperture or from within the anus, its duration and if continuous or *intermittent A slight discharge of mucus* suggests the presence of a benign adenoma or papilloma, while if it is very abundant, a tumor of the villous variety, or a myxorrhea proctocoli should be carefully considered Puruloid and purulent discharges are noted in stricture, various forms of proctocolitis and degenerated malignant processes If the discharge is described as exuding from an opening or site outside the anus, it is well to ascertain if it tends to cease only to discharge again for such is quite characteristic of a fistula Here the history is of great value because it is common for a patient to mention the presence of an antecedent ab cess or "boil" which opened spontaneously or was lanced by a physician one or more times, only to recur Often a purulent discharge accompanied bv pain and soreness in the region of the lower spine above the coccyx may be cited and is very suggestive of pilonidal sinus

Swelling Its location, duration if inflamed, tender, movable whether rupture *has occurred and if so spontaneous or* incisional It is important to know if a similar condition occurred at a previous time Swelling as a result of perianal abscess is commonly encountered, cysts and lipomata are more rare Skin tags are of frequent occurrence and usually of long duration Epithelioma esthiomene and condylomata both the lata and accuminata types, may be described by the patient as swellings but in reality are granulomatous masses and are therefore quite firm Conditions presenting themselves at the anal aperture which may be mentioned as swellings are protruding internal and external hemorrhoids papillomata, prolapse and procidentia

Sensations Itching crawling burning fullness, weight in the pelvis urgent desire for stool their duration and relation to defecation Itching is characteristic of the pruritic syndrome Frequently it is intract

able, worse at night, and unrelieved by scratching Itching of less intensity is common in cryptitis, papillitis and hemorrhoids A sensation of crawling is suggestive of some parasitic infection, whereas that of burning usually denotes an abrasion of the anal skin Fullness and weight in the rectum or pelvis may be cited in hemorrhoidal excrescences of the internal variety, in pre and postrectal cysts, and in large benign and malignant tumors An urgent desire for stool is often described in rectal malignancy and less frequently in inflammatory stricture, whereas a feeling of incomplete evacuation is cited in hemorrhoids, cancer, stricture and severe inflammatory processes of the rectum

Bowel Action Whether constipated, and

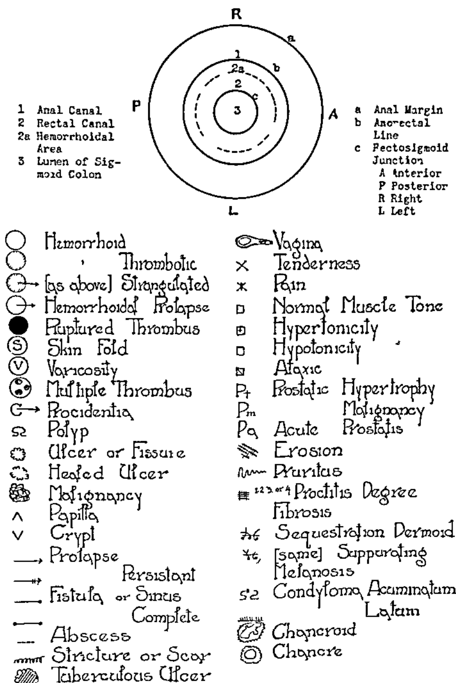


FIG 57 Symbols employed to designate various processes of the anus rectum and colon (Collier F Martin)

if so, its duration and the frequency of stool, if accompanied by pain or blood, the consistency of the stool whether hard or soft, its shape the color, and whether covered or streaked with mucus blood or pus Is action complete and satisfying?

If diarrhea is present, the duration, character and color the consistency as well as the number of stools per day if it occurs in previous diseases suffered by the patient, especially anorectal operations or injuries, or any other surgical intervention

Under family history, special inquiry should be made as to the existence of tuberculosis, polyposis, malignancy, syphilis or amebiasis in one or more members of the family since such may bear influence on the present case

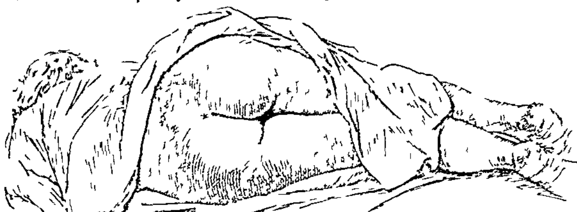


Fig 58 Left lateral or Sims position (undraped) Ideal for inspection digital and low proctoscopic examination

the early morning and if it alternates with constipation Inquiry as to the use of cathartics and enemas should be made and a history of associated tenesmus obtained A change in bowel habit ' is a most constant symptom in rectal and sigmoidal malignancy early morning diarrhea is less frequently complained of in the same condition Loose stools mixed with blood purulent material and debris are seen in stricture malignancy and ulcerative types of proctosigmoiditis

The patient s age, occupation habits and environment are also important factors to consider

Present Past and Family History

The present history should embody any associated symptom or condition which may offer a direct or indirect bearing on the anorectal pathology, as a feeling of weight or pressure in the pelvis pain over the sacral region or down the legs, meteorism nausea and vomiting

The past history should include any

EXAMINATION

In all cases the method of examination following the history should be in chronological order

1 Inspection
2 Palpation
3 Digital examination
4 Anoscopy
5 Proctoscopy and sigmoidoscopy
6 Roentgenogram

The only exception is in the presence of severe pain, as experienced in periproctitis (abscess) and tenesmus as commonly occurs in fissure hemorrhoidal prolapse and thrombotic hemorrhoids In each case, the physician should be unbiased in his interpretation until the sequence of procedures tabulated above has been completed

Method of Charting To record the findings in each case the chart designed by Collier F Martin [6] (Fig 57) has been found of service

Inspection

This is best accomplished by placing the patient in the left lateral or Sims' position,

as shown in Figure 58 When the patient is appropriately draped the buttocks are gently separated, one hand being firmly placed on each If the patient complains

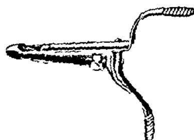


Fig 59 Brinkerhoff speculum

during this procedure even though it be gently done, it is evident that he has been suffering considerable pain Such a condition should enjoin additional care and extreme gentleness on the part of the examiner Much may be learned by inspection of the parts The following are the marks which should chiefly be looked for and their significance excoriations on and between the linear rugae characteristic of pruritus redness and swelling seen in peri anal abscesses external openings of ano rectal fistulae—if these are located near the coccyx and show protruding hair they indicate presacral dermoid cysts skin tags condylomata esthiomene and epitheliomata about the anal margin external hemorrhoids cutaneous and thrombotic and at times the lower margin of a fissure and

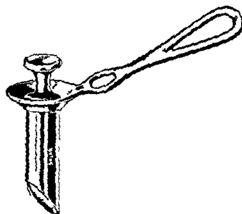


Fig 60 Hirschman proctoscope

certain protrusions, such as rectal and anal papillomata internal hemorrhoids, prolapse and procidentia In addition, the sacrococcygeal region should be inspected for the presence of a dimple or pilonidal sinus through which purulent material may exude and hair protrude All findings should be correlated before continuing with the examination

Palpation

Where a fistula is present gentle and firm palpation will usually elicit a cordlike induration extending from its outer opening toward the anus The induration, fluctuation and tenderness of an abscess may also be noted by this procedure

Abdominal Palpation Palpation and percussion of the abdomen are indicated in all cases

Digital Examination

Since the co operation of the patient is essential to a complete and thorough examination, the finger must be inserted gently in order that disturbance to these sensitive areas may be minimized and the patient s confidence gained

Procedure The index finger, covered by a finger cot and well smeared with a water soluble lubricant, is gently inserted to the second joint The examiner should endeavor to detect any change from the normal smooth feel of the skin of the anal canal Areas of induration elevations or depressions may be felt The tone of the external sphincter should be noted whether normal, relaxed or spastic It will be recalled that ataxia of the external sphincter muscle is often one of the earliest signs of disease involving the posterior and lateral columns of the spinal cord, particularly tabes dorsalis and those cases of paresis showing tabetic syndromes as cited by Martin[77] It is well to keep in mind that the greater percentage of conditions affecting the anus and rectum occur within reach of the examining finger For this reason the finger should be introduced to its full extent and in a circular

motion to detect any divergence from the normal smooth surface of the rectal mucosa The coccyx and uterus or prostate should be palpated In the female bimanual examination, with one finger in the vagina and one in the rectum will prove helpful in detecting pathology in the intervening wall Not infrequently lesions in the upper rectum and prolapsing processes of the sigmoid may be palpated by use of the squatting position

ANOSCOPIC EXAMINATION ANOSCOPY

This procedure is best accomplished by means of a fenestrated anoscope or short conical proctoscope with the patient in the left lateral or Sims position (Fig 58) The self retaining instrument with a light located in the head of the detachable handle may be employed The right buttock is held up by the patient or by the left hand of the examiner to facilitate the introduction of the anoscope The tip of the anoscope is carefully smeared with a water soluble lubricant and the instrument slowly but firmly pressed into the canal during which process it is gently rotated The obturator is removed the light turned on and the anal canal and anorectal line are inspected Digital as well as instrumental examination is possible through a short instrument In this way the anus may be carefully inspected for hypertrophied papillae inflamed crypts the internal opening of a fistula and small thromboses Crypts other than normal may be readily drawn down by means of a crypt hook inserted through the anus

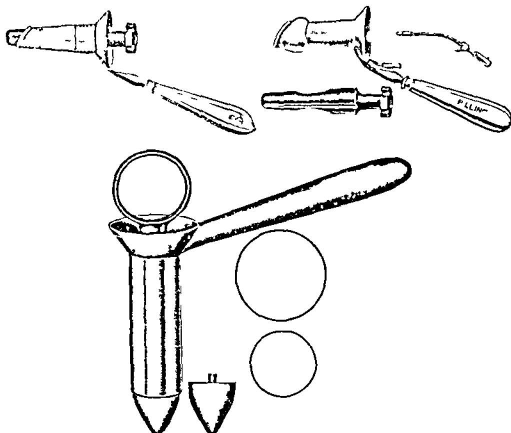


FIG 61 (A) The Collier F Martin proctoscope ideal for routine use (B) Electric lighted self retaining proctoscope—a modification of the C F Martin instrument (C) Neuman s proctoscope

Proctoscopic Examination

Proctoscopy, if properly performed, necessitates good illumination without obstruction to the eye or instrumentation, and may be obtained with the lighting arrangement at either the proximal or distal end of the scope Many types of specula are marketed, the one used being largely a matter of personal choice (Fig 61)

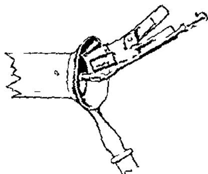


Fig 62 Light adapter for the Martin proctoscope

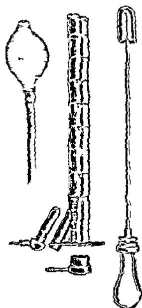


Fig 63 Yeoman s proctosigmoidoscope

Procedure The patient is placed in the left lateral position and the well lubricated speculum is gently inserted with a slight rotary motion to minimize any discomfort When an assistant is not at hand or the patient is not co operative, *the self retaining device* is a desirable feature[3] The instrument is easily retained and its introduction through the anal canal is attended by little if any discomfort The light attachment, as shown in Figure 62, is especially well adapted for clinic use and may be applied to any standard speculum Although the light is attached at the proximal end, it offers excellent illumination and neither occludes the view nor interferes with instrumentation By proctoscopy, the lower rectum and anal canal may be examined, and such conditions as hemorrhoids, papillomata, ulcerations, crypts, fissures and foreign bodies visualized

Proctosigmoidoscopic Examination

This is a routine part of the examination and should never be omitted except in the presence of an acutely painful process, such as abscess and fissure

Proctosigmoidoscopy is accomplished by means of a tube ten to twelve inches in length and one half to one inch in diameter It is electrically lighted with the bulb at either the proximal or distal end Most sigmoidoscopes are fitted with an adjustable magnifying lens placed in the head of the collar which also has the advantage of closing the proximal end of the tube (Figs 63, 66) A small outlet attached to a rubber *hand bulb permits the tube to be inflated* with air, which causes ballooning of the bowel beyond the distal end of the instrument

Method of Sigmoidoscopy Preparation When possible, it is advisable to examine the rectum and sigmoid colon before, as well as after cleansing, since much may be learned from the fecal material—its color odor consistency, and adherence to the bowel wall These findings should be charted and the patient prepared with a cleansing enema of from one to two quarts of water (110° F) Ordinarily this is given the night before the examination but as a working rule at least four hours should elapse between the administration of the enema and the time of examination Only too frequently one such cleansing will be

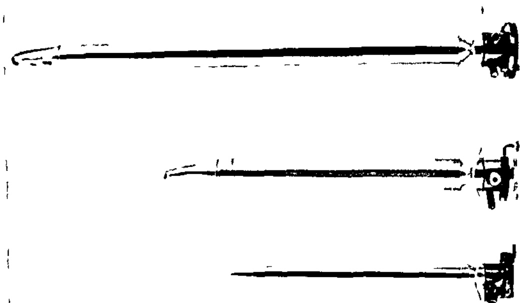


Fig 64 Montague sigmoidoscopes Bottom scope ½ inch in diameter valuable for infants

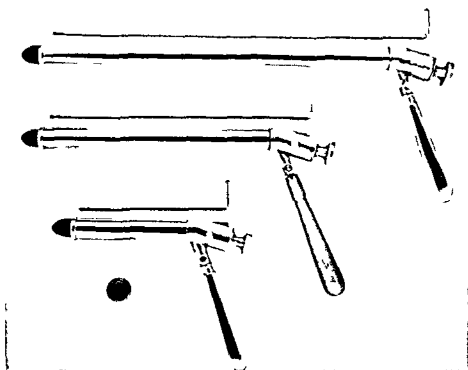


Fig 65 Author's stainless steel proctosigmoidoscopes Lengths 10 22 and 36 cm

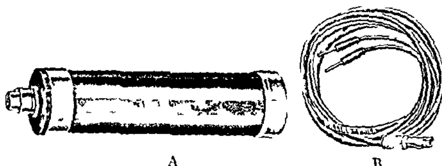


Fig 66 Electrical apparatus (A) Ordinary battery handle (B) battery cord



Fig 67 Knee shoulder position for sigmoidoscopy The limbs are vertical, the knees slightly separated

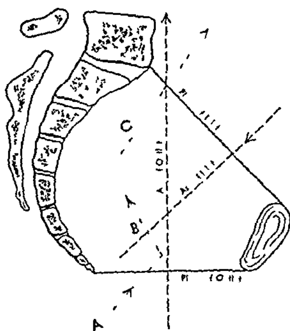


Fig 68 The pelvic planes (A) The axis of the anal canal (B) The axis of the rectal ampulla (C) The axis of the sigmoid (R Gorsch)

found insufficient repetition should then be requested until the bowel is clean For this purpose an enema of glycerine and water or milk and molasses may be used to advantage It should be remembered that a clean bowel is essential for thorough examination and no report should be made until this condition has been fulfilled

Anesthesia Sigmoidoscopy is routinely performed without anesthesia, although exceptionally, where sphincterismus is present or the patient is highly neurotic, the inhalation of nitrous oxide and oxygen or intravenous sodium pentothal may be permissible

Position *The patient assumes the knee shoulder (Fig 67) or inverted position* [0] using a Hanes or Buie table (Figs 69 70) Every effort should be made to place the patient as comfortably as possible and gain his or her co operation Pleasant conversation until the examination has been

completed assists in diverting the patient's attention

DRAPING After the removal of all clothing that has a tendency to interfere with the examination, the patient is draped preferably by a nurse in the case of a female, so that only the perianal region is exposed

insertion is under the direct guidance of the eye

Second Step The instrument is pressed onward gently and slowly, but the direction is upward and backward toward the sacrum (Fig 72) The distal end of the instrument will be seen to pass over the lowermost, or inferior, valve of Houston

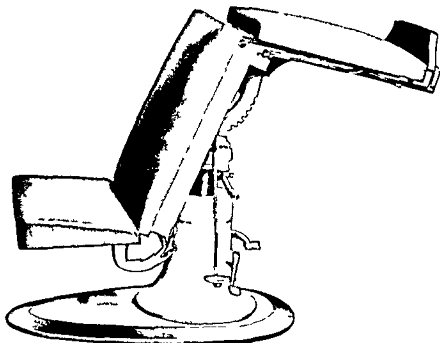


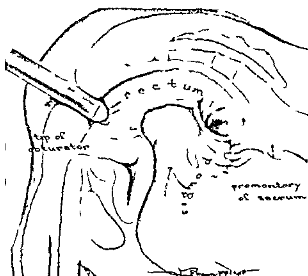
FIG 69 Hanes table in inverted position

PROCEDURE All necessary instruments should be close at hand to facilitate as short an examination as possible

First Step The sigmoidoscope (slightly warmed) is well smeared on all sides with water soluble lubricant and gently inserted with the obturator in place This is more easily accomplished after the cheeks of the buttocks have been separated and the patient asked to strain downward which relaxes the sphincter muscles The direction should be inward downward and forward (as shown in Fig 71) until the tip of the instrument has passed completely through the anal canal and into the rectum, a distance of approximately two inches above the anal margin The obturator is then removed which allows air to pass in, and the lamp attached From this point on the



FIG 70 Buie table



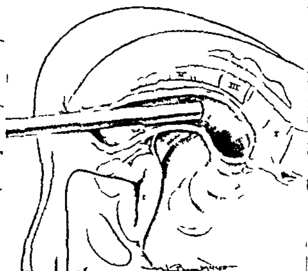


FIG 71 (*Left*) Method of sigmoidoscopy First step Introduction of tip of the sigmoidoscope through the anal canal Patient in knee shoulder or inverted position
FIG 72 (*Right*) Second step Instrument passed under direct vision toward the sacrum



FIG 73 Third step Under direct vision the sigmoidoscope has been advanced into the sigmoid colon

(Fig 74), situated on the left posterior wall about 3 2 inches (8 cm) above the anal margin (see p 7, Anatomy), and for this reason a slight movement of the instrument should be made

Third Step The instrument is then advanced somewhat sharply forward over the prominence of the sacrum (Fig 73) As it is gently pushed ahead, the middle valve of *Houston on the right anterior wall will be* seen about 4 4 inches (11 cm) above the anal margin Above this, the superior valve *of Houston comes into view on the left pos*terior wall about 5 inches (12 5 cm) above the anal margin (Fig 74) Approximately 1 4 inches (3 5 cm) above this point, a narrowing of the lumen is noted, this represents the junction of the rectum with the sigmoid Anatomically it corresponds to the third sacral vertebra Many textbooks *describe the sigmoid as passing to the left,* but occasionally it will be found to the *right, low down and anterior* After this junction has been passed, the tube is in the sigmoid proper, as evidenced by the presence of mucosal folds or rugae Some difficulty may be encountered in advancing the instrument through the area, since this part of the bowel is movable A small *amount of air may be inflated into the* bowel by means of the rubber bellows to facilitate advancement After the sigmoidoscope has been introduced for a distance of 10 12 or even 14 inches it is slowly withdrawn Here again the observer should note any change from the normal, especially *on the upper or superior surfaces of* the valves Should any pathologic process exist, its distance from the anal margin is

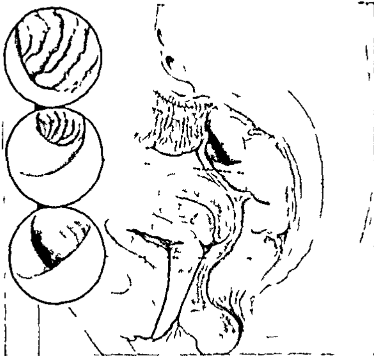


FIG 74 Sagittal section of anus rectum and sigmoid colon showing proctoscopic views of the valves of Houston In the middle and upper circle the rugae of the sigmoid are visible

measured in inches or centimeters by means of the calibrated scale on the instrument

Precautions in Performing Sigmoidoscopy This procedure is very simple, but it is not without complications, which at times have proved disastrous Strangely enough a correct posture is essential for painless and thorough examination In assuming the knee shoulder position, the thighs should be vertical and the knees separated slightly the back diagonal but not arched, and the patient resting on the left shoulder and left side of the face The right arm rests on the table above the head Where the inverted position is assumed using a special table (Figs 69 and 70), little difficulty is encountered although, unless properly instructed patients are prone to arch their backs The introduction of the sigmoidoscope in the presence of severe pain has been mentioned so will not be repeated here It is advisable to call attention to the fact that there is often a variation in the diameter of the anal aperture either normally or as the result of some congenital or pathologic process therefore a proctosigmoidoscope of small caliber, such as a ½ inch size should be available All these precautions should impress the fact that the examiner has undertaken a delicate procedure which must be accomplished as thoroughly but as painlessly as is possible The tip of the obturator and the instrument on all sides should be well smeared with a water soluble lubricant It is then introduced slowly and firmly but without force When the instrument has been inserted beyond the sphincter muscles approximately 2 to 2½ inches the obturator is withdrawn the electric light inserted, and the current turned on After passing the sphincters, the instrument must never be advanced except under direct vision Another point to be remembered is that the tip of the sigmoidoscope should not be pushed against the wall but rather the mucosal folds should be teased aside This may be accomplished by slight manipulation of the proximal end or handle As an additional warning to the beginner, the

instrument should not be forced if the bowel is filled with fecal material If the bowel contents cannot be removed readily by cotton swabs, spoons forceps or suction, the patient should be requested to prepare again and return for another examination

POSITIONS FOR EXAMINATION

The left lateral or Sims position (Fig 58) is especially well adapted for perianal inspection and digital, anal and low proctoscopic examinations, whereas the knee shoulder (Fig 67) and inverted positions are most satisfactory for upper proctoscopic and sigmoidoscopic examinations In palpating procidentia and polypoid growths, it is sometimes helpful to have the patient assume the squatting position The exaggerated lithotomy, inverted or jackknife and left lateral positions are useful for operative procedures

ROENTGENOGRAPHY

Roentgen study should follow proctosigmoidoscopy in every instance except in the presence of obstructive signs and symptoms, but it is well to realize that, as far as the rectum is concerned, such study is merely an adjunct to more reliable diagnostic procedures such as endoscopy and digital examination Lesions of the rectum, unless bulgy or constrictive are usually poorly defined by roentgen examination but barium and double contrast enemata are indicated not only for the possible available information concerning the rectum but also to visualize the entire colon and thus rule out disease of an inflammatory or neoplastic character above the rectum Therefore, a study of the rectum and sigmoid is incomplete unless it includes opaque and double contrast enemata One must be mindful that even though a neoplasm is palpable and visible on sigmoidoscopy, other disease processes such as polypi a second neoplasm diverticuli, etc, may exist at a higher level and not be discernible by these methods of examination Therefore, a study of the rectum and sigmoid is not complete unless a radiologic examination by opaque enema followed by air inflation is done

Cancer of the intestine is a curable disease but its cure depends upon early diagnosis and radical surgical extirpation It is indeed discouraging to realize the bitter fact that more than 50 per cent of all patients with malignancy in these parts are inoperable from the point of cure when examined by the consultant

While it is obvious that several factors are to be held responsible for delay, improper and inadequate roentgen diagnosis is not to be minimized

In the practice of large bowel surgery, one becomes most critical of x ray examinations as frequently made It is well to realize that lesions in the lower portion of the bowel, especially the upper rectum, rectosigmoid and lower sigmoid, are at times most difficult to visualize and may readily tax the ingenuity of the most expert roentgenologist It is not uncommon for the referring physician to request an x ray study of the colon without divulging to the roentgenologist the salient symptoms and/or findings, and the site under particular suspicion By the same token, the roentgenologist may inadvertently neglect to make inquiry of the patient Closer cooperation between the physician and the roentgenologist results in a better understanding of the diagnostic problem and serves to stimulate a more intensive search for disease in the area under suspicion While the character of the preparation for an opaque enema study is a moot one, there is no excuse for an examination without adequate preparation When the clinical findings are strongly suggestive of organic disease, a negative x ray report based on a single examination must be viewed with suspicion and should not be accepted until verified by subsequent roentgen study, which is carried out after thorough preparation of the patient and a consultation between the referring physician and the radiologist A procedure to be deplored is the administration of a barium meal for the

purpose of visualizing a suspected lesion in the lower bowel Properly the methods outlined on page 55 should be followed namely an opaque enema preceded by proctosigmoidoscopy

Preparation Ordinarily one and one half ounces of castor oil are given by mouth the night before the examination No supper nor breakfast the following morning is permitted

Procedure Two quarts of water heated to body temperature and containing seven ounces of barium sulphate are administered by the gravity method The barium mixture is allowed to run in slowly through a metal tube inserted into the rectum for a distance of two inches the container being two feet above the table The patient assumes the supine position as the mixture passes into the rectum Under fluoroscopic control the progress of the barium column is carefully observed and checked by film (Fig 75) Based on the original investigations of Stewart and Illick[4] and the modifications of others[11, 13, 41, 49] a true lateral projection has supplemented the oblique position in examinations of the large bowel In brief to the addition of the anteroposterior view a right antero oblique film is made during the actual introduction of the barium A true left lateral view of the sigmoid and rectum is deferred until after complete filling of the colon For the best results the barium should be administered under fluoroscopic control Spot or flash films are made during the introduction of the opaque material Upon completion, air is inflated according to the double contrast technic[14, 1, 41, 4] This procedure is of especial value for tumors of small size

Normally the rectum appears as a smooth S shaped shadow Malignancy is noted as a fixed or constant ragged deformity usually more marked on one side than on the other while inflammatory stricture shows as a rule, an irregular tubular deformity involving the entire circumference uniformly Extramural conditions causing displacement of the rectal shadow may occur from an abscess in the retrorectal space or cul de sac of Douglas, pre and postrectal dermoids enlarged prostate, benign growths, especially fibromata sarcomata and carcinomata, the latter may be a metastatic growth in the rectovesical pouch



Fig 75 Normal appearance of the rectum following injection of barium

(rectal shelf) from a malignant process in the stomach pancreas ascending colon kidney gallbladder esophagus or breast[4] and a prolapsing cancer of the sigmoid retroflexion and tumors of the uterus and displacement of the sigmoidal shadow from ovarian tumors and cysts distended bladder or retroperitoneal sarcoma

BIOPSY

Biopsy or the removal of tissue for microscopic examination is the most accurate method of determining the diagnosis of abnormal tissue Its greatest field of applicability is in malignant and suspected malignant growths and it is advocated routinely in these conditions unless there is some particular contraindication or means of objective diagnosis and permanent record As far as advantages are concerned, if the findings are positive the histogenesis

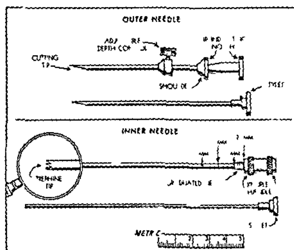


Fig 76 Turkel needle of value for biopsy of extrarectal masses

may be disclosed, the degree of malignancy observed and the radiosensitivity determined Under disadvantages may be mentioned the possibility of stimulating the activity of the growth, thereby causing dissemination of the malignant cells (See Chap 19, Malignancy, Part I, p 669) Perforation is very unusual and hemorrhage is infrequent The removal of tissue is of utmost value in demonstrating tuberculous lesions and those caused by lymphogranuloma venereum Gentle scarification of the ulcer base with the tip of the biopsy forceps and the removal of the edges has proved satisfactory in the isolation of the *Endamoeba histolytica* and Bargen s diplostreptococci (Fig 78)

Technic The patient assumes the knee shoulder or inverted position and without anesthesia, the sigmoidoscope is introduced as previously described until a good view of the growth is obtained This is swabbed with cotton applicators to remove pus, blood and debris that may smear the surface The biopsy forceps or punch is then introduced through the instrument and a specimen of sufficient size removed from a suspicious area or that considered most likely to show the nature of the process Where possible, a piece should be taken from both the floor and edges of the ulcer If the tumor is to be examined for lymphopathia venerea or malignancy for example, the specimen is placed in formalin or formol alcohol solu

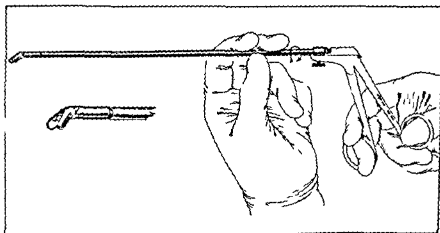


Fig 77 Biopsy forceps (Turell)

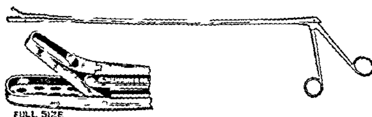


Fig 78 Punch

tion and sent to the laboratory for study On the other hand, where a culture is desired, neither formalin nor formol alcohol is used but rather one of the culture media (see p 71) Hemorrhage is rarely encountered but can usually be controlled by the topical application of a saturated solution of potassium permanganate or by electrocoagulation Lesions within the anus and about its margin, of course require an anesthetic Usually novocaine injected locally is sufficient

TESTS

Some ten years ago various departments at Temple University Hospital employed the Gruskin intradermal diagnostic test[19] in known patients with malignancy Our results, published elsewhere[5, 6, 9] were encouraging although some investigators[29] did not confirm our findings or those of others[1, 10, 3, 25, 30, 39, 43, 46, 47] Further experimentation with this test disclosed a high incidence of error and for this reason it is no longer employed

TESTS FOR SYPHILIS

The Wassermann Kahn and Kolmer tests are employed routinely to determine the presence of syphilis In the case of anal chancre, and sometimes condyloma latum the spirochaete can be demonstrated by the dark field illumination technic (See Chap 13, Venereal Disease) Occasionally an indeterminate mass a condylomatous process or an ulcer is encountered which fails to regress or heal under the usual means of therapy Here the blood Wassermann is of value, and if it is positive proper antisyphilitic treatment should be instituted Formerly stricture of the rectum and anal esthiomene were thought to be of luetic origin but it is now fairly well established that both are sequelae of lymphogranuloma venereum It should be borne in mind that the type of patient in whom such a process is found not infrequently shows evidence of syphilis and often tuberculosis and gonorrhea as well in fact malignancy and amebiasis may also complicate the picture[7, 21] A positive blood Wassermann does not necessarily mean that the local lesion, a rectal stricture for instance, is luetic in origin In the presence of an ataxic anus without a history of injury or severance of the sphincter muscles, as has been encountered following a fistula operation, a spinal fluid Wassermann is indicated This will be a means of differential diagnosis, as ataxic anus may occur where syphilis involves the posterior and lateral columns, especially in tabes dorsalis and those cases of paresis showing tabetic syndromes[7] In brief, one of the accepted blood tests should be made as a routine measure and a spinal fluid examination when deemed necessary In each case where the reaction is positive appropriate treatment should be instituted

TEST FOR GONORRHEA

Although gonorrheal proctitis is not common it is frequently necessary to determine the presence of the causative organism Ordinarily the Gram stain is used, although Jensen s modification is considered more reliable The Pappenheim Saathof stain and the method of Kopeloff and Bierman may be employed also

Jensen s method is as follows 0 6 per cent of an aqueous solution of methyl violet is applied to the fixed smear for 20 to 30 seconds This solution is poured off and washed away with strong Lugol s solution (iodine, 1 part potassium iodide, 2 parts distilled water 100 parts) The strong Lugol s solution is poured on again for 30 seconds after which it is washed off with absolute alcohol This is washed away with fresh 98 per cent alcohol, rocking the slides to and fro and renewing the alcohol until the decolorization is completed A solution of neutral red (neutral red ½ Gm , 1 per cent glacial acetic acid, 2 cc and distilled water 1000 cc) is applied for one to three minutes This is washed off with distilled water and dried between filter paper (Two per cent safranin or 0 3 per cent aqueous basic fuchsin, may be used as alternative

counterstains in place of the neutral red solution) When stained in this manner the pus cells and gonococci take on a negative Gram stain Intracellular Gram negative diplococci and pus cells may be taken as absolute evidence of the disease

TEST FOR LYMPHOGRANULOMA VENEREUM OR LYMPHOGRANULOMATOSIS INGUINALIS

Skin tests and a complement fixation test are employed to establish the diagnosis of lymphogranuloma venereum Frei in 1925[13] originated the intradermal test using an antigen material aspirated from lesions occurring in humans with the disease As reported[7, 8, 10, 8] it proved of distinct diagnostic value in anorectal disease and inguinal adenopathies The technic is as follows

Method One tenth (0 1) cc of the antigen is injected intradermally in the arm of the patient The reaction which reaches its maximum from 48 to 72 hours after the injection is then read A positive test is characterized by the appearance of a hard red papule around which may be noted an erythematous ring In some cases especially where stronger dilutions are used (1 5 or 1 2), pustule formation is more prone to occur as shown by a central area of necrosis Reactions that are strongly positive are considered specific while those that are weakly positive or difficult to interpret should be repeated The subject is described in detail on page 359

Mouse brain antigen was developed subsequently by Grace and Suskend[17] and appears to be an improvement over the former A physiologic saline suspension of mouse brain previously infected with the virus of lymphogranuloma venereum is inactivated by the addition of formalin to 0 1 per cent A positive reaction is evidenced by the production of a papule 7 mm in diameter or larger The method, which has been shown to be superior in many respects, is that devised by Rake McKee and Shaffer[1] Use was made of yolk sacs harvested from chick embryos moribund or recently dead from infection with the virus of lymphogranuloma venereum and containing the agent in high concentration The virus is noninfective when heated to 60° C for 30 minutes The test is performed by injecting 0 1 cc of the antigen intradermally into the flexor surface of the forearm a similar amount of the control is injected in the other arm A positive reaction consists of a firm papule 5x5 mm or more in diameter which appears within from 48 to 72 hours with a negative or only slight reaction at the site of the control inoculation The test usually becomes positive from three to eight weeks after initial exposure to the infection Grace and his co workers[10] found this antigen to possess greater sensitivity and specificity than the mouse brain antigen

TEST FOR CHANCROID (ULCUS MOLLE)

Occasionally one will find it necessary to distinguish accurately rather than by exclusion between various types of lesions about the anus The Ducrey s bacillus which is the causative factor, is Gram negative and with this stain is almost colorless in its center and quite definite at its ends In tissue from the anus, it may be demonstrated by Gram s stain We have employed the Reenstierna test[3, 33, 34] using Dmelcos vaccine (suspension of Ducrey's bacillus and streptococci) to differentiate anal chancroids from lesions due to lymphopathia venerea

Method One tenth cc of the Dmelcos vaccine is injected intradermally into the *forearm of the patient A large red papule* with ill defined edges occurs in positive cases in from 72 to 96 hours

Scratch Test A simple and accurate method for the detection of chancroidal infection was devised by Rosser in 1926 Smith[10] describes the technic as follows An outer portion of the buttock is cleansed with alcohol and allowed to evaporate thoroughly and the skin to dry Several scratch like abrasions by means of a sharp sterile needle are made in the prepared area The exudate from one of the [illegible] s taken

by means of a sterile cotton applicator and rubbed into the fresh scratches in the buttock. For control the opposite buttock is scratched in like manner but protected from contamination with the exudate. A positive test is characterized by the appearance of a chancroidal ulcer within 48 hours; the control will reveal scratch marks only.

Test for Tuberculosis

It should be clearly understood that demonstration of the tubercle bacillus (mycobacterium tuberculosis) in smears from a discharge, or better, in the tissue itself, is the most accurate means of diagnosis. (See Chap. 14, Tuberculosis.) It is expedient, however, to employ at times other means, but it must be said that to determine the presence or absence of tuberculosis using tuberculin is a most perplexing problem. Either it is inert in a large percentage of instances or there is considerable chance of falsely interpreting many reactions as positive. The standard tuberculin termed Purified Protein Derivative (P.P.D.) as prepared by Seibert[31-33] and adopted by the National Tuberculosis Association is considered of greater value than O.T. in that it is free of salts and nonspecific proteins and that its potency is reproducible. Method: The first dilution (0.00002 mg.) is injected intradermally into the forearm and the reaction read and measured *in 48 hours*. If negative, the second dilution (0.005 mg.) is injected in a similar fashion and the reaction read and measured. Positive reactions are calibrated as follows:

1. reaction shows area of swelling measuring from 5 to 10 mm. in diameter.
2. reaction shows area of swelling measuring from 10 to 22 mm. in diameter.
3. reaction shows area of swelling exceeding 20 mm. in diameter.
4. reaction shows area of swelling and definite necrosis.

Blood Tests

Sedimentation Test. In certain pathologic conditions of the anus, rectum and colon, as in other parts of the human organism, there is noted an increased tendency to sedimentation of red corpuscles. The estimation of this rate has been made possible by rendering the blood noncoagulable with oxalate or citrate.

Technic (Wintrobe and Landsberg).[45] Five cc. of blood is withdrawn in a dry syringe and placed in a tube containing the anticoagulant (mixture of 6 mg. of dry ammonium oxalate and 4 mg. of potassium oxalate). The Wintrobe hematocrit tube is filled to the 10 cm. mark with the resulting fluid by means of a capillary pipette. The tube is placed at room temperature and the point to which the corpuscles fall on the mm. scale is noted and charted for a period of one hour. Finally, the tube is centrifugalized and the volume of the packed erythrocytes charted. In acute abcesses which are especially extensive, such as ischio-, retro- and pelvirectal, the sedimentation will be greatly increased or very fast, whereas in various types of ulcerative proctosigmoiditis, abcesses of lesser magnitude, diverticulitis and tuberculous lesions it is more likely to be slightly or moderately increased, or fast.

Blood Count. Marked secondary anemia is frequently encountered in bleeding hemorrhoids of long duration, chronic mucosal ulceration and malignancy. Leukocytosis is encountered in acute infections as abscess and lymphocytosis in tuberculous lesions unless complicated by mixed infection. Eosinophilia (over 3 per cent) is usually characteristic of intestinal parasites. (See Chap. 10, Proctosigmoiditis.) The presence of diabetes, nephritis or gout may be determined by estimating the blood sugar, urea nitrogen or uric acid. Although it is not always possible or expedient to obtain these reports, they will prove of utmost value in many cases. Prior to operation, however, all such indicated laboratory tests are, of course, a matter of routine.

The Urine

Routine examination should be made for existing disease. The presence of sugar may

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The Urine

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point to an intractable pruritus Indicanuria in excess is usually indicative of protein putrefaction in the intestine

The Feces

This represents the residual mass of material remaining in the intestine after complete digestive and absorptive functions have been exercised Food residues, the remains of intestinal and digestive secretions, certain substances excreted from the bowel, especially the salts of iron and calcium, cellular elements and bacteria normally constitute the fecal mass, which ultimately is expelled

Odor Under normal conditions, the odor is due largely to indole and skatole, which products are formed in the process of intestinal putrefaction This, of course, is influenced greatly by the character of the diet for instance, it is intensified where a large quantity of meat is ingested, and lessened where the diet is composed mostly of vegetables The odor of the stool is especially offensive in certain pathologic conditions such as various specific and nonspecific ulcerative processes In malignancy because of decomposing blood and malignant tissue, the fecal discharges have a peculiar fetid or mephitic odor which is considered by Hibshman to be characteristic This however can be recognized only after one s olfactory sense has been trained

Amount Although the amount of the fecal excretion varies in different individuals being affected materially by the type of diet the daily average for an adult is 100 Gm

Reaction Ordinarily the reaction varies between neutrality and slight alkalinity, the former being noted immediately after defecation Occasionally the reaction is acid following a vegetable diet

Consistency Both the form and consistency of the stool are dependent on the diet to a large extent Normally it is cylindric in form and doughy, whereas in the presence of marked ulceration it is quite devoid of form and mixed with mucus, blood and pus In anal stenosis and low rectal stricture the stool may be ribbon shaped

Color Normally the stool is brown owing to the pigment, hydrobilirubin The diet, of course, bears influence, for instance, where milk in large quantities has been ingested, the stool is very light brown, while with a diet made up almost exclusively of meats the stool is more likely to be dark brown Certain drugs affect the color of the stool for example, that following the administration of bismuth or iron is black, of calomel, green, and of santonin, rhubarb and senna, yellow Stools streaked with bright red blood suggest some pathologic process in the anorectal area, while a black or blackish stool indicates bleeding from a higher site in the intestinal tract

Bacteriology

Smears These may be made directly from the mucosa of the rectum, from the discharge as it seeps through the anus, or from the stool Undoubtedly the first is the most accurate A drop of the purulent material or a small particle of the stool (latter suspended in water) is placed on a clean glass slide and dried over a flame After staining it is examined under the microscope through the oil immersion lens To demonstrate the gonococcus, Gram's stain is used for *Treponema pallidum*, dark field illumination using unstained smears or, at times, Giemsa's stain, for Ducrey's bacillus, aniline dyes (all described under Chapter 13, Venereal Diseases) the tubercle bacillus, Ziehl Neelsen stain (see Chapters 14 and 7, Tuberculosis and Tuberculous Fistulae) the *Endamoeba histolytica* Zenker s or Schaudinn's stain and the *Bacillus dysenteriae*, aniline dyes (both described in Chapter 9)

Culture Because of carelessness or improper technic on the part of the clinician, laboratories time after time report "contamination," or "the usual organisms found,' in cases subsequently proven specific at one hospital or another The taking of a culture as performed by the proctologist

represents something more than inserting an applicator through an instrument and brushing it against the mucosa of the rectum and sigmoid colon The procedure should be carried out with precision realizing that it means expense to both patient and laboratory and entails much assiduous application on the part of the bacteriologist In taking cultures from the mucosa of the rectum and sigmoid the knee shoulder or inverted positions are most satisfactory A sterile proctosigmoidoscope should be introduced in the manner described on page 58, under direct vision After the lesions from which a culture is to be taken have been located a sterile applicator at least two inches longer than the instrument is passed through it pressed gently but firmly against the most suspicious ulcerative process, and rolled Then it is withdrawn and placed in the sterile culture tube

Now the area is swabbed dry and another applicator inserted for a second culture Provided the applicator is properly made, that is if part of the cotton pad extends beyond the tip of the wood or metal applicator it may be used as a sort of curette, to be drawn toward the operator rather than pushed away As soon as the swab has been withdrawn it is placed in the culture tube The culture tube should be held by an assistant and the closed mouth flamed before the cotton plug is removed The applicator is introduced into the tube, the end of which is again flamed, and the sterile cotton plug replaced

The usual media employed are hormone broth and blood agar Rosenau s brain broth is the medium used for demonstrating the diplostreptococcus of Bargen All methods will be found described under their respective chapters

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CHAPTER 3—PART 1

Malformations of the Anus and Rectum

EMBRYOLOGY

The ovum after fertilization by a process of segmentation forms the morula, which differentiates into an inner cell mass and by the vitelline duct That portion of the gut tract above the opening of this duct is called the foregut that below, the midgut and the distal or caudal end the hindgut

Epiblast (ectoderm or epiderm)
Mesoblast (mesoderm) { A Outer layer } Somatopleure
{ B Inner layer } Splanchnopleure
Hypoblast (entoderm or endoderm)

trophoblast the former dividing into an ectodermal and entodermal vesicle The latter consists of the epiblast mesoblast and hypoblast enclosed in the blastocyst By the splitting of the mesoblast and its union with the epiblast and hypoblast two layers are formed the somatopleure and splanchnopleure leaving between these two the coelomic cavity or primitive yolk sac

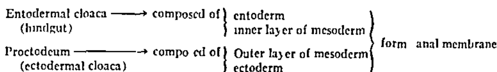
By the formation of four amniotic folds —head tail and two lateral—the body wall coelomic cavity and gut tract are indicated The gut tract is that portion of the primitive yolk sac which is enclosed within the body wall The part ventral to the body wall is the definitive yolk sac The vitelline duct or yolk stalk is the connection between the gut tract and yolk sac

At this time the gut tract is a single straight tube occupying a mesial position of the body cavity connected ventrally and dorsally to the body wall by the mesoblast Ventrally, it is connected with the yolk sac

The blind end of the hindgut in the vicinity of the allantois becomes dilated at about the third week of embryonic life to form a pouch known as the entodermal cloaca (Fig 79) This receives the intestinal secretions from the gut tract and the urinary and genital secretions from the allantois which is an outgrowth or evagination of the intestinal tube From the allantois are formed the bladder and urogenital sinus Shortly after the third week of embryonic life this entodermal cloaca descends At the same time, the ectodermal cloaca or proctodeum becomes invaginated and the depression thus formed is called the "anal pit" In this way the entodermal cloaca and the ectodermal cloaca approach each other (seventh week) [18] The site where these two meet is not at the extreme lower portion of the gut, but a short distance upward on its anterior aspect so that, when communication is later established between the entodermal

and ectodermal cloacae, the portion distal to this point of union termed postanal gut, completely disappears about the eighth week although the neurenteric canal usually becomes obliterated before this time [1, 4] (Fig 80)

Between the sixth and seventh week the entodermal cloaca is divided into the post allantoic gut (rudimentary rectum) dorsally and the urogenital sinus ventrally by the urogenital septum [34] This later grows and extends toward the surface to form the perineal body During this time the entodermal cloaca and ectodermal cloaca, or proctodeum have become fused (Fig 81) the inner layer of mesoderm, which is a part of the former, is pushed aside, and the outer layer of the other is pushed aside, so that the remaining outer entodermal and inner ectodermal layers blend to form the



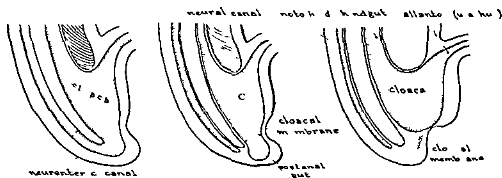


Fig 79 (*Left*) The endodermal cloaca at the third week of embryonal life

Fig 80 (*Right*) On the left the proctodeum has become invaginated and approaches the endoderm Distal to this point will be seen the postanal gut On the right the ectoderm and entoderm have fused As communication is established the postanal gut normally disappears Eighth week

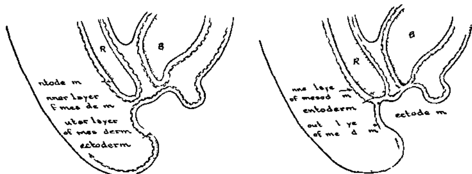


Fig 81 (*Left*) Minute detail of the hindgut and proctodeum approaching each other The inner and outer layers of mesoderm are shown

Fig 82 (*Right*) The inner and outer layers of mesoderm have been pushed aside and the ectoderm is shown approaching the entoderm

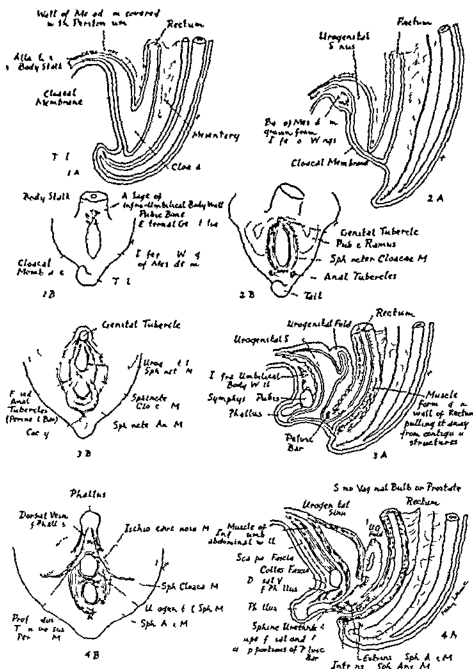


FIG 83 A Synchronization of entodermal cloacal development and differentiation of mesodermal borders of cloacal membrane A1 4 sagittal sections of caudal portion of body B1 4 front views of cloacal membrane showing inferior wings of mesoderm and structures developing from them 1B distal extremities of inferior wing of mesoderm forming band at upper extremity of cloacal membrane where it extended on the body stalk 4A UG fold is the genital portion of urogenital fold where the interovaginal canal has formed (Levy Am J Surg 45 393 Plate XIII)

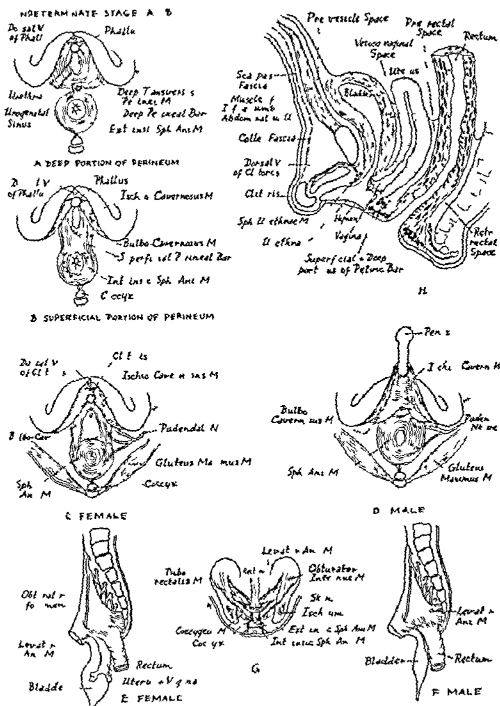
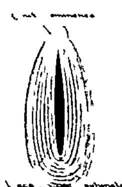


FIG 83 B Completed pelvic and perineal structures A and B indeterminate stage—perineal musculature deep and superficial portions front view C and D perineal musculature female and male front views E and F, sagittal sections, female and male pelves G longitudinal muscle of rectum in relation to levator muscle external sphincter ani and skin showing extrinsic and intrinsic levator and sphincter ani H relations of the peritoneal lining of the pelvic cavity Retroperitoneal cavities of the pelvis Structures separating cavities from the exterior (Levy Am J Surg 45 393 Plate XIV)

anal plate or anorectal membrane (Fig 82) At the eighth week this membrane is absorbed, leaving a free communication between the rectum and anus This line of junction between the cloaca and proctodeum represents what is called the pecten,[3c] pectinate line or better the anorectal line





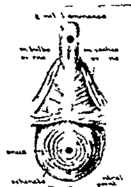


Fig 84 (*Left*) Sphincter of the cloaca in the second month (after Keith)

Fig 85 (*Center*) Muscles of the embryo at the beginning of the third month

Fig 86 (*Right*) Muscles of the male embryo at the end of the third month (after Keith)

At about the same time that the rudimentary rectum extends downward to meet the proctodeum the circular and longitudinal muscle fibers may be recognized Keibel [9] remarks as follows the circular muscle layer ends abruptly at the level of the caudal swelling of the intestine and may be referred to as the beginning of the internal sphincter ani The outer longitudinal layer ends at the same level but no sharp caudal limit is recognized The external sphincter muscle is clearly indicated and is relatively quite large (Figs 84, 85 86)

As has been shown the anus rectum and sigmoid colon are derived from three distinct tissues entoderm mesoderm and ectoderm and developed from two structures the hindgut (cloaca or postallantoic gut) and proctodeum The failure or arrest of this process of development results in one or more of the various anomalies

During very early development a canal connecting the primitive yolk sac and amniotic cavity is formed which becomes obliterated later, during fetal life Near the lower end and on dorsal aspect of the hind gut is the opening of the "neurenteric canal which is connected to the neural tube

MALFORMATIONS OF ANUS AND RECTUM

Anomalies of the anus, rectum and sigmoid colon are comparatively rare Although innumerable references may be found in medical literature the occurrence of these developmental defects may be considered as one in 5 900 to 10 000 childbirths As far as sex is concerned, malformations are more common in males than in females [14]

Incidence as to Sex (Author s Cases)

Males	56
Females	44
Total	100

The condition is commonly associated with other congenital deformities Dmytryk [11] for example, noted such an occurrence in 33 per cent of his series of cases

Author s Experience

In a personal series of 100 patients presenting malformations in this category, 29 per cent showed additional anomalies on examination as tabulated in the following table

ASSOCIATED CONGENITAL ANOMALIES

Anomaly	No of Cases
Harelip and cleft palate	2
Meckel s diverticulum	1
Polycystic kidney	1
Exstrophy of bladder	3
Hypospadias	4
Omphalocele	1
Undescended testes	2
Spina bifida	2
Meningocele	2
Pyloric stenosis	2
Hirschprung s disease	1
Club feet	1
Syndactylism	2
Supernumerary digit	2
Atresia of vagina	1
Imperforate hymen	2
Total	29

Patients with congenital anomalies of the anus, rectum and sigmoid colon are subject to a considerable mortality which may result more from the associated congenital deformities than from surgical therapy

MALFORMATIONS OF THE ANUS (ECTODERM)

Total Absence of the Anus

Absence of the anus is due to complete failure of the proctodeum to invaginate The rectum may descend to a point just above the perineum or may remain at a higher level

Symptoms The anomaly or absence of meconium is usually noted by the nurse or the parent Crying, restlessness, straining and vomiting are frequently cited

Diagnosis On inspection, a slight depression or button of skin may be noted at the site where the normal anus should be, or the central raphe may extend in a firm, unbroken line from the scrotum to the coccyx[6] Discoloration may be present There is no passage of meconium, the abdomen is tense, and vomiting, as well as other signs of obstruction, soon develops Bulging of the perineum may be present or an impulse may be noted during a siege of crying In some cases a sense of fluctuation may be felt with one finger over the anal area and the hand making firm pressure on the lower abdomen"[1] In the female, the diagnosis is often facilitated by inserting the little finger into the vagina Not infrequently this anomaly is found associated with spina bifida,[7] hypospadias, exstrophy of the bladder, and atrophy of the vagina [8]

Treatment The treatment consists of an immediate simple anteroposterior incision over the site of the normal anus (Fig 87) The underlying tissues are carefully incised

CLASSIFICATION

- Anus
  - Total absence of the anus
  - Occlusion of the anus
    - Membranous
      - Complete
      - Partial
    - Fibrous
      - Complete
      - Partial
  - Abnormal location of the anus
- Rectum
  - Total absence of rectum
  - Arrest in descent of rectum
  - Opening of the rectum into some viscus as bladder vagina urethra uterus Anus normal or absent
  - Duplication
  - Triplication
- Sigmoid
  - Atresia and stenosis of sigmoid colon
  - Duplication
  - Triplication
  - Microcolon
  - Megacolon—congenital
    - acquired

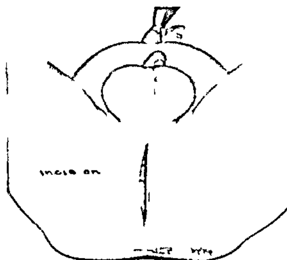


FIG 87 An anteroposterior incision is made in the midline as illustrated

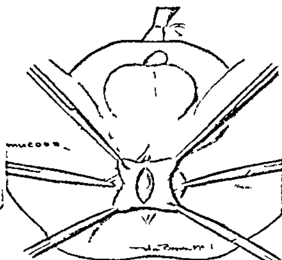


FIG 88 The pouch has been brought down and held taut with hemostats

by blunt dissection and retracted until the rectal pouch is located Throughout the operation the finding of the rectum is greatly facilitated by the sense of touch The pouch is grasped with hemostats drawn down into the wound and anchored on each lateral side with silk or linen passing through the skin and outer coats of the rectum (Fig 88) The pouch is slit anteroposteriorly and the incised sphincter muscle and skin in front of and behind the newly formed orifice is sutured transversely with catgut (Fig 89) In order to prevent contamination of the wound a small rubber tube is inserted into the anus and tied in place for two or three days

When difficulty is encountered in locating the rectal pouch or when the rectum is situated at a high level a median perineal incision as above described extending from the scrotum to the coccyx will aid in demonstrating the bowel Resection of the coccyx and removal of the lower segments of the sacrum have been advised [1, 38] If after careful and thorough search the rectum cannot be located the performance of a left inguinal colostomy is to be recommended, followed later by a proctoplasty

Postoperative care consists of daily cleanliness and dilatation either with the finger or bougies to keep the anus patulous Sulfathalidine in suspension is instilled into the rectum every four hours through a small catheter or rubber syringe

OCCLUSION OF THE ANUS
(IMPERFORATE ANUS)

This anomaly may be membranous or fibrous and either classification may be complete or partial

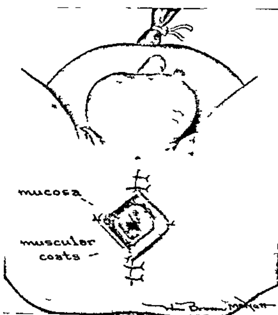


FIG 89 The pouch has been slit open and the edges sutured to the skin as shown

Complete Membranous Occlusion of the Anus This developmental defect is due to the complete failure of the anal plate (anorectal membrane) to be absorbed and is usually seen within the first few days after birth

SYMPTOMS Complete absence of meconium followed later by crying straining and restlessness is cited by the parent or nurse

DIAGNOSIS In this type of malformation the diagnosis is made by the absence of meconium and the ability to insert the finger into but not through a normal appearing anus Bulging of the membrane may be felt as the child cries and strains Abdominal distention and vomiting ensue

TREATMENT It is advisable to attempt insertion of the finger through the occluding membrane as such may often cause its rupture If, however the membrane is thick and penetration cannot be accomplished by this method, a crucial incision is made and the edges are trimmed with scissors Subsequent finger dilatation may be necessary to keep the canal patulous



FIG 90 R U age 7 years Extensive presacral fistula associated with spina bifida Vesicovaginal fistula also present

Partial Membranous Occlusion Abnormal Narrowing Congenital Stenosis Usually, this defect occurs at the anorectal line (junction of proctodeum and hindgut) and is due to incomplete absorption of the anal plate or anorectal membrane In such, the anal canal below the point of narrowing is normal

Less frequently as the result of faulty development of the proctodeum, the constriction occurs in the anal canal This stenosis may be present in any portion of the anus from the margin to its union with the rectum, or it may extend throughout the entire length of the anus[31] It may be crescentic or annular in shape and centrally or laterally placed (Figs 91 92) Instances of a vestibular abnormal anus during pregnancy have been reported[12 19] As has been pointed out, fissure in ano is frequently associated with congenital anal stenosis It is, no doubt quite apparent that the word stricture has been avoided inasmuch as this term is reserved to represent an organized constriction resulting from some infective process in which the muscular[1]

the bowel is involved. Thus we encounter in the rectum but not in the anus.

Symptoms. Again the symptoms are proportionate to the degree of narrowing. In one infant dribbling of meconium ribbon like stools constipation and mucoid or bloody discharge may be cited, later associated with straining bloating and restlessness another may suffer from slight straining and constipation and even reach adolescence before the condition is found. Usually the fecal contents become solid and hard so that each attempt at defecation is attended by considerable pain. Various reflex phenomena due to the stenosis and sphincter spasm such as gastro intestinal disturbances physical impairment and loss of weight are frequently noted.[1]

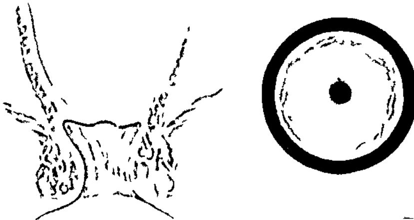


Fig 91 (A) Coronal section of anal canal and rectum showing the ringlike stenosis at the anorectal line (B) Same as seen by the anoscope



Fig 92 (A) Coronal section showing sickle shaped stenosis (B) Same on anoscopy

Diagnosis. Dribbling of intestinal contents from a normal appearing anal aperture the detection of a thin, occluding membrane in the anal canal, especially at the anorectal line as evidenced by inability to pass or difficulty in passing the little finger and the introduction of a blunt pointed probe or small rectal sound through the opening will determine the diagnosis.

Treatment. Gradual dilatation with the lubricated finger is usually sufficient to render the anus patulous, while, in the more severe cases a small longitudinal incision or the insertion of the tips of closed scissors,

Complete Membranous Occlusion of the Anus This developmental defect is due to the complete failure of the anal plate (anorectal membrane) to be absorbed and



Fig 90 R U age 7 years Extensive presacral fistula associated with spina bifida Vesicovaginal fistula also present

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Treatment It is advisable to attempt insertion of the finger through the occluding membrane as such may often cause its rupture If, however the membrane is thick and penetration cannot be accomplished by this method, a crucial incision is made and the edges are trimmed with scissors Subsequent finger dilatation may be necessary to keep the canal patulous

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congenital absence of the vagina have been reported [13, 14]

Symptoms Usually the nurse or parent will call attention to the anomaly, having noted meconium or fecal contents discharging elsewhere than from the normal opening

Diagnosis On inspection the abnormal position of the opening is diagnostic of the condition The modified skin of the anus may be easily differentiated from the mucous membrane of the rectum by its dull hue and lack of redness Upon insertion of the little finger contraction of the sphincter muscle may be readily noted, especially when the child cries Usually meconium or fecal matter may be seen discharging from the aperture

Treatment It is important to determine whether there is sphincteric control and if the opening is of sufficient size to permit passage of the bowel contents If sphincteric control exists no immediate treatment is necessary If, on the other hand the sphincters are absent and the abnormal opening is not too far from the natural location the anus anal canal and lower rectum are dis

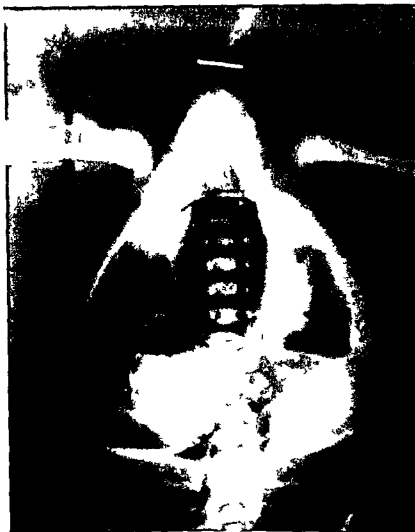


Fig 97 X ray with child inverted using air and fluid content to outline distal site of bowel A coin is used to mark normal location of anus

which are then opened will give the desired result Subsequent dilatation of the opening with the finger at daily intervals may be necessary

Fibrous Occlusion of the Anus This too, may be partial or complete, and consists of fibrous tissue located about the margin of the anus It may be situated transversely or anteroposteriorly

Symptoms If partial, there is dribbling of meconium or fecal contents, and constipation in proportion to the degree of occlusion When complete, there is absence of meconium, constipation, and abdominal distention Other symptoms characteristic of retention, as previously mentioned, soon develop

Diagnosis On inspection of the perineum the fibrous band may be seen readily, as shown in the accompanying diagram (Fig 93)

Treatment Incision through the attachments of the fibrous band at its junction with the anal margin is indicated

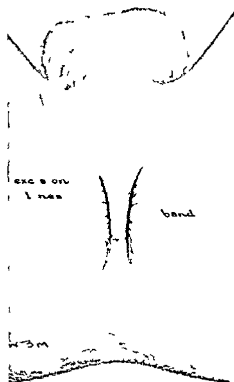


Fig 93 Partial occlusion of the anus due to fibrous band Dotted lines show site of incision

Abnormal Location of the Anus

This anomaly is of rare occurrence and is due to invagination of the ectoderm at an abnormal location Those cases which present the characteristic modified anal skin lining the canal are included under this heading In such the sphincter muscle usually will be found surrounding the aperture The abnormal site of the anus may occur at any point in the perineal, scrotal or sacral region (Fig 94) Instances of associated

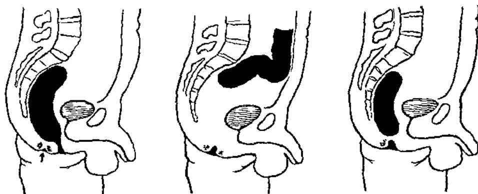


Fig 94 (*Left*) Abnormal location of the anus In this sketch the anal canal is situated anterior to the anus

Fig 95 (*Center*) Sketch showing entire absence of the rectum the anal canal normal

Fig 96 (*Right*) In this sketch the rectum has been arrested in its descent



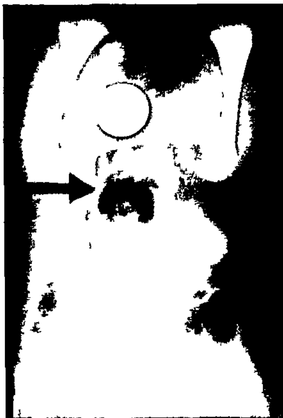


FIG 99 Baby L Total absence of anus with abnormal descent of rectum X ray on left shows height of air column at twenty four hours x ray on right shows height at forty eight hours

and transplanted to the anal margin By perineal approach the sphincter muscles are preserved and the bowel pulled through

3 Closure of the transversostomy is effected thereafter always before the school age

ARREST IN DESCENT OF RECTUM

This anomaly results from improper or arrested descent of the entodermal cloaca and failure to come into apposition with the proctodeum The distance is variable and may be at the level of the peritoneal reflection or between it and a point posterior to and below the apex of the invaginated proctodeum without connection to it (Fig 96) The anus may be present or absent

Symptoms The absence of meconium usually calls attention to the condition which is not suspected because of the normal appearance of the anus Later, abdominal distention vomiting and other signs of obstruction develop

Diagnosis When the child cries or when pressure is exerted over the abdomen the finger may detect the conveyed impulse of the rectal pouch if it be within close proximity to the anus When the pouch cannot be felt its location may be determined by the method previously mentioned—flat x ray plate of the pelvis with the child in the inverted position (See p 84) Cachovic[5] believes this is a most helpful adjuvant

Treatment If the impulse is conveyed on digital examination, and the roentgenogram with the child in the inverted position indicates the rectal pouch to be low lying and in close proximity, then the operation is approached by the perineal route Here an anteroposterior incision is made in the



Fig 98 A P Absence of rectum disclosed by x ray study with child inverted Coin placed over normal site of anus Colostomy established twenty four hours after birth Height of air column is noted

sected free, transplanted and sutured in their normal position

MALFORMATIONS OF THE RECTUM (ENTODERM)

Total Absence of the Rectum

Fortunately this anomaly, which is due to faulty development of the hindgut is exceedingly rare The colon may extend unattached in the abdominal or pelvic cavity or it may be suspended by a fibrous cord attached below to the cellular tissue behind the prostate and neck of the bladder[4] In such cases the anus may be wholly or partially developed or entirely absent (Fig 95)

Symptoms Absence of meconium or bowel contents, as well as straining and crying is cited by the parent or nurse Unless surgery is instituted, the classical signs of obstruction, namely abdominal distention, borborygmus, persistent vomiting that is usually fecal, and artificial patterning rapidly follow

Diagnosis That the rectum is not patulous may be readily diagnosed by the absence of feces and the inability to insert the finger into it

A flat plate of the abdomen and pelvis with the infant held head downward, as suggested by Wangensteen and Rice,[39] has proved of value in outlining the rectal pouch by the gas in the intestine A metal marker is placed on the perineum and as the gas rises, the blind end of the pouch is outlined The distance between this and the metal marker may be judged (See Fig 98) The findings may also help to determine the surgical route—perineal or abdominal Although this is an ingenious method and one that should be more frequently employed, it is not without fallacy during the period from the first 20 to 36 hours of life[24 41] Should it fail, the position or absence of the rectum can be ascertained only by exploratory incision Only too frequently, death ensues before the anomaly is discovered

Treatment In the presence of marked obstructive symptoms or where the diagnosis of entire absence of the rectum is assured, an immediate transversostomy should be performed Following a period of adequate defunctionalization utilizing daily instillations of nonabsorbable sulfonamides in suspension form the anomaly may be corrected It has been our experience that a three stage procedure may be well chosen

1 An immediate transversostomy of the Wangensteen type

2 Between the third and fifth year of age the sigmoid and rectum are freely mobilized through an abdominal incision

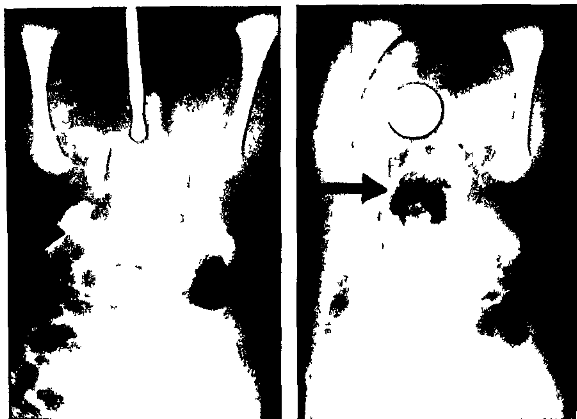


Fig 99 Baby L Total absence of anus with abnormal descent of rectum X ray on left shows height of air column at twenty four hours x ray on right shows height at forty eight hours

and transplanted to the anal margin By perineal approach the sphincter muscles are preserved and the bowel pulled through

3 Closure of the transversostomy is effected thereafter always before the school age

Arrest in Descent of Rectum

This anomaly results from improper or arrested descent of the entodermal cloaca and failure to come into apposition with the proctodeum The distance is variable and may be at the level of the peritoneal reflection or between it and a point posterior to and below the apex of the invaginated proctodeum, without connection to it (Fig 96) The anus may be present or absent

Symptoms The absence of meconium usually calls attention to the condition which is not suspected because of the normal appearance of the anus Later, abdominal distention vomiting and other signs of obstruction develop

Diagnosis When the child cries or when pressure is exerted over the abdomen the finger may detect the conveyed impulse of the rectal pouch if it be within close proximity to the anus When the pouch cannot be felt its location may be determined by the method previously mentioned—flat x ray plate of the pelvis with the child in the inverted position (See p 84) Cachovic believes this is a most helpful adjuvant

Treatment If the impulse is conveyed on digital examination and the roentgenogram with the child in the inverted position indicates the rectal pouch to be low lying and in close proximity then the operation is approached by the perineal route Here an anteroposterior incision is made in the





FIG 100 A P (A, *Left*) X ray of child in upright position, showing transverse level of gas No diagnostic information is offered by such (B, *Right*) the value of the Wangensteen Rice technic is shown (note column of air with child in inverted position)

midline of the perineum, which may be extended to the scrotum and coccyx in order to facilitate the exploration Resection of the coccyx and removal of the lower sacral segments are seldom necessary The levators and underlying tissues are carefully dissected and retracted and even though a sound is placed in the urethra or vagina it is well to hug the hollow of the sacrum in order to avoid injury to the genito urinary tract "Cut, retract and feel" should be the procedure, because only in this way will perforation of the pouch be prevented The dissection is continued until the finger detects bulging The rectal pouch is then freed and brought down to the margin Two or three traction sutures are inserted Proper mobilization is necessary to prevent subsequent retraction The pouch is sutured with several interrupted catgut stitches and the sphincter muscle, previously divided anteriorly and posteriorly in the original incision is sewed together Following closure of the skin edges, a small rubber tube is introduced for a period of from 48 to 72 hours Subsequent finger dilatation is often necessary A suspension of sulfathalidine is instilled into the rectum through the tube every four hours

If, however, after thorough search the rectal pouch cannot be located, the performance of a left inguinal colostomy is to be recommended, followed later by a proctoplasty A good rule to follow is to employ the available methods in order to locate the pouch, but it is well to remember "when in doubt do a sigmoidostomy or preferably a transversostomy"

Rectum Opening into Some Other Viscus

This is the most frequent of all malformations of rectum and anus comprising 50 per cent of all cases [7] The various types of these malformations are designated according to the organ with which the rectum communicates

Atresia Ani Vesicalis (Rectovesical Fistula) Here the rectum communicates with the bladder, usually by a very arrow



FIG 101 Film exposed with the patient in the anteroposterior position suspended with head down visualizes a gas filled portion of the rectum which ends about where one would expect to find the anus It is observed that this loop of bowel does not communicate with the under half of the body through an anal opening as the lower end of the pouchlike air filled bowel is smooth in contour

canal lined by mucous membrane (Fig 103) It rarely takes place in the female sex

SYMPTOMS Usually the parent relates the occurrence of greenish discoloration in the urine with absence of feces through the normal site of the anus

DIAGNOSIS The presence of dark greenish stains of meconium or fecal material in the urine especially occurring at the time of urination is characteristic of communication between the rectum and bladder The injection of 12½ per cent sodium iodide into the external opening is worthy of trial[3] Lipiodol or diodrast (20 per cent solution) may be substituted

TREATMENT Because of the possibility of obstruction and infection such as cystitis and pyelitis early surgical intervention in the form of a temporary colostomy is to be highly recommended Cystostomy also may be instituted Attempt at repair because of technical difficulties carries with it a high rate of mortality The performance of a temporary transversostomy is a wise choice and after a period of four or five years, preferably just prior to school age,



FIG 102 R G Rectovesical fistula at birth for which transversostomy was performed Illustration shows appearance of prolapsing loops at time child was admitted for repair and correction of fistula

repair should be instituted Here the communicating viscera are separated by abdominal exposure and the opening of each viscus invaginated in itself by suturing the raw edges together Using the perineal route, the rectal pouch is grasped brought down and sutured in the normal site of the anus

Case No 117041 T U H B C Male Age 7 Patient was admitted by parents because of (1) vesical incontinence (2) anal incontinence and (3) diarrheal stools from fifteen to twenty a day

H.P I According to the charts of the hospital where the baby was born and previously treated, it was found at birth to have a congenital absence of the anus with the median perineal raphe extending from the scrotum to coccyx without interruption Previous to operation, which was performed eighteen hours after birth, a urethral catheter was passed with difficulty and one half cubic centimeter of red fluid aspirated with a syringe Under ether anesthesia a midline incision was made in the anal area the subcutaneous tissue divided by blunt and sharp dissection and the rectum found to be easily accessible This was opened and sutured to the skin to form and establish an artificial anus The following day, an intravenous urogram was made, because the patient had not urinated The kidneys and bladder were visualized, but no abnormalities were noted During the procedure a large amount of clear urine was evacuated from the bladder

The perineal wound was reconstructed and resutured on the sixth and again on the seventeenth postoperative days Otherwise the convalescence was uneventful and the baby was discharged on the 35th postoperative day with the diagnosis "Congenital absence of the anus"

Two months later the baby was readmitted with parents complaining that the baby urinated through the artificial anal opening and passed no urine through the penis Intravenous urography at this time reported, 'Distal half of right ureter appears to be definitely dilated Both kidneys and ureters functionally active"

There was a definite tendency toward retention of urine in the distal half of the right ureter with apparent constriction of the ureter close to the ureterovesical junction Pelvis and calyces showed no evidence of back pressure At operation under ether anesthesia the bladder was entered through a suprapubic incision A vesicorectal fistula was demonstrated A urethral stenosis prevented the passage of a catheter sound or bougie Another incision was made through the cavernous urethra about two centimeters from the end of the penis A small bougie was passed through the posterior portion of the prostatic urethra and the obstruction was broken Incisions were closed with a retention catheter left in the urethra After removal of the retention catheter two weeks later, the patient voided normally

The subsequent course for the next five years was characterized by persistent diarrheal stools rectal incontinence, urinary incontinence and chronic distention of the abdomen The boy was chronically weak, listless and undernourished Repeated visits to various doctors and numerous trial diets failed to relieve the symptoms

Fourteen months ago at the age of six, patient was again admitted to the same hospital for treatment of anal stenosis Barium study at this time revealed massive distention of the sigmoid and colon which was thought to be secondary to the anal stenosis Intravenous urography revealed (1) impaired function of both kidneys, (2) pyelectasis on the right approaching hydronephrosis (3) moderate ureterectasis, (4) displacement cephalad of

urinary bladder and (5) vesicorectal fistula

Treatment consisted of repeated anal dilatations, five in all. These procedures were complicated by the formation of a pararectal abscess which was opened and drained. During this admission fecal material was noted passing through the urethra.

P.E. Male child, small for age of seven, pale, undernourished, listless and apathetic, with markedly distended abdomen shows picture of a chronic debilitating disease. Abdomen large but not tense. Abdominal veins prominent. Borborygmus present. Peristaltic waves can be seen. No masses or organs palpable. Lower midrectus scar present. External genitalia normal with both testicles in scrotal sac. Anal scar present. Anal opening large. No sphincter tone present.

Laboratory Red blood count 4 470 000 Hemoglobin 12.4 grams W.B.C. 12 700 polyneutrophils 59 per cent lymphocytes 34 per cent monocytes 3 per cent eosinophiles 3 per cent basophils 1 per cent. Leukocytes show toxic granulation.

Urine was yellow in color and turbid in appearance. Specific gravity 1.012. P.H. 7.5. Albumin slight trace 50 milligrams per 100 cubic centimeters. Sugar negative. Occult blood slightly positive. Casts none. Leukocytes 6 to 8. Red blood cells 2 to 3.

Barium enema studies reported: Under fluoroscopic observation active peristaltic waves were seen to traverse the entire colon.

Film record reveals a diffusely dilated colon from the cecum to the anus. Haustral markings are well preserved, however slight irregularity of the surface is seen suggesting superficial ulceration. Since the colon and the rectum are distended and since peristaltic activity was noted it may well be that instead of the megacolon of Hirschsprung's disease we may be dealing with a megacolon secondary to anal atresia.

Intravenous urogram revealed tremendous enlargement of the right ureter extending from the ureteropelvic junction to a point a few inches proximal to the ureterovesical junction. Ureter immediately proximal to bladder was normal in caliber. A moderate degree of hydronephrosis was associated with the mega ureter. The report further ventured that the mega ureter could be caused by a stenotic lesion or that it could be congenital in origin without ureteral stenosis.

An anal sigmoidoplasty was performed to relieve the anal stenosis during which procedure the internal opening of a fistulous tract was revealed just within the anal opening anteriorly. The tract was explored and found to pass anteriorly. A Babcock sump drain was introduced and produced several ounces of clear yellow fluid resembling urine. After a period of convalescence, a suprapubic cystotomy was performed and an indwelling catheter inserted to keep the intravesical pressure at a minimum.

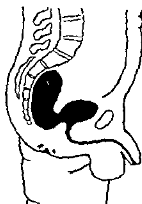
Treatment for the following five months consisted of rectal and vesical irrigations with diet regulated to produce soft, formed stools. Supplementary vitamins were added. Educational therapy was aimed at instructing patient in the voluntary control of bowels and bladder. These measures produced marked improvement of the lad's general condition and reduced the abdominal distention. However, no control over defecation or urination was seen for five or six months and an abdominal colostomy was contemplated to divert the fecal current. During the last month of hospitalization, however, perfect control was developed for urination and marked improvement over control of bowels was seen.

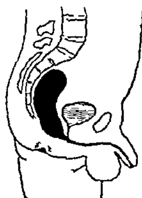
Barium enema at this time revealed no change in the morphology of the large bowel but fairly active peristalsis was visualized. Most significant was the observation that the patient was able to almost completely evacuate the contents of the large bowel. A lateral roentgenogram with diodrast instilled into the bladder showed no evidence of a rectovesical fistula. With these findings and with the clinical improvement of the patient it was deemed trialworthy to discharge the patient and observe further developments in the out patient clinic.

In January 1947 the child was readmitted for additional study. A Wangensteen transversostomy was made as a temporary procedure prior to resection and closure of the vesical fistula. As a final step the transversostomy was closed.

Atresia Ani Urethralis (Recto urethral Fistula) This anomaly is more frequent in the male sex, and represents a communication between the rectum and the urethra (Fig 104.) Although the urethral opening usually is to be found in its membranous portion it may occur in the prostatic site. Like the former type the tract leading from the rectum to the urethra is lined with mucous membrane.

Symptoms. Usually the physician is informed of the passage of meconium or fecal





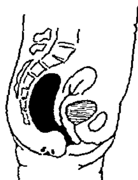


Fig 103 (*Left*) Sketch showing the rectum emptying into the bladder

Fig 104 (*Center*) Sketch in which the rectum communicates directly with the urethra

Fig 105 (*Right*) The rectum emptying into the vagina



Fig 106 L T three days Meconium passing through penis X ray disclosed height of air column with coin as marker Colostomy immediately established

contents from the meatus of the urethra, *either continuously or intermittently*, and independent of urination

Diagnosis The escape of meconium or fecal matter through the urinary meatus, unmixed with and independent of the urinary flow is diagnostic of this anomaly

Treatment Since the rectal pouch in these cases is usually situated at a lower level, surgery offers an excellent prognosis Lynch feels that correction of the defect should be preceded by a colostomy because of infection of the urinary tract Should the urethral opening permit sufficient drainage of the fecal contents, the operation may be postponed to a later period or until the general health of the child has improved An anteroposterior incision is made in the mid line of the perineum after which the underlying tissues are carefully dissected and retracted until the pouch of the rectum is located After its urethral communication has been severed the rectum is drawn down into the wound and sutured in its normal location, as previously described The remaining perineal fistula usually closes spontaneously

Atresia Ani Vaginalis (Rectovaginal Fistula) *In this case the rectum communicates with the vagina* the latter opening occurring at any point between its junction



FIG 107 L T age three days Diodrast injected into urinary bladder Fistulous tract between urethra and bowel



FIG 108 L T Colostomy seven days following operation

with the cervix of the uterus or the point where it meets the vulva Not infrequently this anomaly is complicated by an imperforate hymen which is characterized by the presence of a greenish membrane bulging between the labia Incision of this obstructing membrane is indicated following which the flow of meconium and relief of the condition ensues

SYMPTOMS Communication with the vagina may cause no symptoms and may exist for twenty or more years before the anomaly is noted but usually at one time or another the passage of meconium or fecal matter through the vaginal outlet will be noted (Fig 105)



FIG 109 Baby R age nine days Inadequate opening into vagina Enormous dilatation of bowel Note tapering rectum toward metal coin Patient colostomized Rizzoli operation will be performed after third year followed by closure of colostomy

Diagnosis The escape of meconium or fecal matter from the vaginal outlet instead of through the normal site enables the physician to make the correct diagnosis with little difficulty

Treatment Surgical intervention is indicated in such cases, but the proper time is controversial Experience has shown that if the vaginal opening is of sufficient size to permit exit of the intestinal contents, the operation may be postponed until between the third and the fifth year If the orifice is inadequate, then dilatation may be instituted

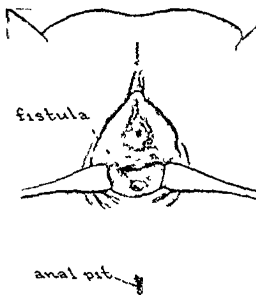


Fig 110 Illustration showing the opening of the rectum in the vagina Anal pit marks the normal site

Various methods have been offered for the correction of this defect Primary colostomy may be performed, with subsequent dissection of the tract, and proctoplasty The perineal operation consists of locating the rectal pouch through an anteroposterior incision After separation of the tract, the pouch is brought down and sutured to the skin at the normal site of the anus The vaginal opening is then closed by sutures The operation of Rizzoli[30] probably offers the most satisfactory results This procedure is indicated especially in those cases in which the communication occurs in the lower portion of the vagina (Fig 110) It consists of a midline incision extending from the posterior margin of the vagina to the normal site of the anus The underlying tissues are dissected and the rectal pouch is located and freed of its surrounding attachments The opening in the vagina is carefully dissected by an elliptic incision (conserving the sphincter muscle in this site) and transplanted intact, with the rectal pouch in the normal site of the anus (Fig 111) The vaginal and perineal incisions are then closed by interrupted catgut sutures (Fig 112) In our experience, this procedure has been extremely satisfactory

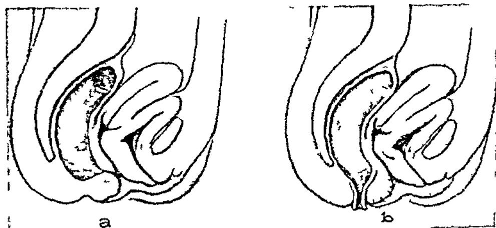


Fig 111 Rizzoli operation Sagittal section (a) of rectum opening into the vagina and (b) after the rectum has been transplanted to the normal site

although, as Dixon[10] points out, infection and separation of the perineal wound following transplantation are not uncommon This occurred in several of our cases, and although the convalescence was prolonged the final results were satisfactory In one patient we employed the Stone[3] modification of the Rizzoli operation by transplanting the vaginal opening and the bowel to a site in the midline of the perineum without carrying the incision through the perineum proper While technically more difficult, the wound in this instance did not become infected, although retraction of the rectal pouch occurred David[9] wisely suggests that flaps of anal skin be tacked to the mucosa which as we have shown following proctosigmoidectomy prevents subsequent stenosis and a wet anus

Murdock has modified the Rizzoli operation for atresia ani vaginalis which he feels is superior in that it better complies with the principles of plastic surgery as related to the anorectal region In this procedure the dissection is made on three sides of the rectum only The result is a U shaped incision with the integument intact between the coccyx and mucous membrane The opening of the rectum is transplanted to its normal location There is minimal buckling of the pedicle of the "U" Utilization of the pedicle principle has permitted Murdock to operate upon these patients at ages of from four to ten months rather than just prior to school age Correction of the deformity at this early age has resulted in the development of a more satisfactory perineal body (See Fig 113) We have had no experience with this modification

Case No 100667 T U H C K Female Age 10 Months Patient admitted with a history of passing fecal material through vagina since birth When the baby began to take solids it became necessary to irrigate the lower bowel through the vagina in order to produce passage of feces Weight curve normal since birth

Physical examination Normal ten month female infant except for congenital imperforate anus and rectovaginal fistula with an opening in the posterior portion of the vagina

Past history Essentially negative

Laboratory studies On admission, hemoglobin 10 5, rbc 3 76, wbc normal, urine analysis 60 to 180 leukocytes per hpf, otherwise negative

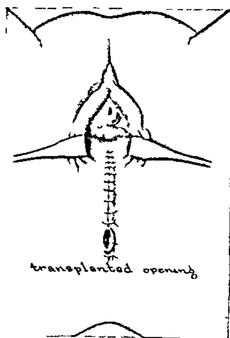


Fig 112 Rizzoli operation Final appearance following transplantation of the bowel

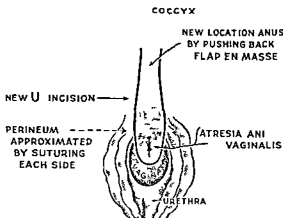


Fig 113 Diagram of U incision Closed end of the U makes an adequate clearance of any possible muscle The intact flap within the U is pushed backward en masse to an approximate normal location for the anal opening It is secured by suturing the levators and perineum together (Murdock)

Operation With the patient under ether anesthesia, an incision was made around the vaginal fistulous opening and carried posteriorly to a point in the midline just posterior to where the normal anus should be The fistula was then dissected free the rectum was mobilized and transplanted to the normal site It was made secure with interrupted sutures, #0 chromic catgut passing from rectal mucosa to anal skin in four quadrants The vaginal defect and perineal incision were closed with #0 chromic catgut sutures Convalescence was uneventful The patient was discharged on the eleventh postoperative day

Atresia Ani Uterinae (Recto uterine Fistula) In this case the rectum opens into the uterus, usually through its cervical portion The anomaly is exceedingly infrequent and rarely offers symptoms other than the passage of meconium through the vagina

Treatment Location of the rectal pouch through a perineal incision and obliteration of the communicating tract with approximation of the rectum to the normal site of the anus may be attempted if the rectum is low lying, but the success of this procedure is questionable Better results may be anticipated by the performance of a left inguinal colostomy as an initial procedure followed by a pull through type of operation with correction of the fistula

Ladd and Chisholm have reported a case of reduplication of the rectum vagina and uterus The diagnosis was established by physical examination, radiologic examination following the injection of hippuran and barium into the rectum and vagina, and surgical exploration of the abdomen These multiple anomalies were thought to have been the result of an arrest in development One rectal orifice appeared to be normal The second rectal opening was placed anterior to the apparently normal one This second orifice did not have sphincter control and was thought for a time to be a recto vaginal fistula The reduplication extended throughout the rectum to a point just beneath the pelvic peritoneal reflection A satisfactory result was obtained by anastomosing the anterior rectal opening to the more normal posterior rectum Ombredanne reported a case of duplication of the vulva clitoris, anus, rectum, colon and cecum with nonfusion of the pelvic bones

CONTINENCE OF SPHINCTER MUSCLE

As may be appreciated, sphincter control is of utmost importance In more than half of our patients an intact sphincter muscle was found in relation to the normal site Quite frequently, muscle fibers possessed of the power of contraction have been noticed around the vaginal opening as determined by a Faradic stimulator A simple incision through the proposed site in the perineum has assisted in determining the presence of the sphincter fibers

MORTALITY FROM OPERATION

The mortality from colostomy was 79 3 per cent as reported by Ziemendorff[43] In his series of 114 collected cases, the mortality was as follows

Atresia without fistula	28 6 per cent
Atresia with fistula	*26 6 per cent*
Atresia with fistula (excluding vaginal connections)	58 8 per cent

Ladd and Gross[22, 23] report 56 deaths, a mortality of 26 per cent, but state that at least 17 of these deaths were directly due to other associated congenital abnormalities and their complications Berman[3] operated upon 18 of his 23 cases with a mortality of 6 6 per cent Over a period of 12 years the total number of deaths was 11, or 47 8 per cent, although in 8, or 72 8 per cent of these deaths, associated anomalies were present which account for their demise Crowell and Dulin[8] report a surgical mortality of 17 per cent Harken[17] found the mortality in his group of 25 cases to be 60 per cent over a period of one year, whereas his surgical mortality was only 20 per cent

The remote results after operation are extremely discouraging, as summarized in the accompanying figures of 223 collected cases reported by Hardouin [16] survival one week, 55 2 per cent, survival one month,

44.4 per cent, lost from observation during first year, 22.8 per cent, survival one year, 13.4 per cent survival twenty years, 5.8 per cent.

Author's Experience

Of our entire group, namely 100 patients there were 11 deaths, a mortality of 11.2 per cent. However, three infants died on admission to hospital without operation. Surgery was performed on 82 children with seven deaths a mortality rate of 8.5 per cent.

The anomalous condition, type of operation and results achieved are appended in the accompanying chart.

Table 1

Congenital Anomaly	Number of Cases	Description and Comment	Cured	Imp.*	Unimp.†	Died
Total Absence of Anus	3	Died on admission—no operation—signs of intestinal obstruction — probably should be classified as absence of rectum or arrested descent (no necropsy)				3
	8	Incision in perineal site and suture of rectal pouch to anal margin	6		1	1
Occlusion of Anus (anal stenosis) membranous—complete	8	Incision and subsequent dilatation (1 death due to pneumonia)				
—incomplete	1[illegible]		18			1
fibrous —complete	[illegible]	Incision or excision with or without plastic operation				
—incomplete	5		3	1		1
Abnormal Location of Anus	2	Both were perineal — three operations were necessary in second case before cure was effected. Operation—transplantation to normal site	2			0
Total Absence of Rectum	5	Colostomy performed. Subsequent correction in 2 cases	2	3		
Abnormal or Arrested Descent of Rectum	11	Anus normal or absent. Perineal mobilization of rectum with suture to skin margin	6	2		3
	1	Unsuccessful perineal attempt followed by colostomy				1
	3	Colostomy alone		3		
	3	Colostomy followed by perineal repair	3			0
Rectovesical Fistula	2	Preliminary colostomy and suprapubic cystostomy followed by repair		2		0
Rectovesicoperineal Fistula	1	Anal stenosis associated with suprapubic cystostomy and successful repair		1		0
Rectovaginal or Rectovulvar Fistula	26	Operation consisting of mobilization and transplantation to normal site. 7 secondary operations necessary. 3 temporary and 1 permanent colostomy	23	2	1	0
Recto urethral Fistula	3	Colostomy and suprapubic cystostomy followed by repair		3		0
Recto uterine Fistula	0					0
Total	100		63	17	2	10

* Imp. improved
† Unimp. unimproved

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CHAPTER 3—PART 2

Malformations of the Colon

ATRESIA AND STENOSIS

Atresia and stenosis of the sigmoid or pelvic colon are rarities, occurring once in 20,000 births.[34] Davis and Poynter in 401 instances of atresia, found 39 located in the colon. Many theories have been promulgated as to the cause of these deformities. Of these may be mentioned failure of recanalization, defective intestinal rotation, healed intussusception, vascular disturbances resulting from vascular anomalies, fetal peritonitis, volvulus and syphilis. Bowers and Cook[19] call attention to the value of the history in these cases, especially vomiting and the absence or abnormality of the meconium. The early appearance and severity of vomiting are in direct proportion to the level of atresia according to these investigators. Absence of meconium indicates a relatively low obstruction and absence of bile pigments places the lesion below the ampulla or else indicates a pathologic process of the bile duct. According to Ladd[1] and Farber[33] atresia occurs before vernix, lanugo and cornified squamous epithelial cells develop and their absence in meconium is evidence of atresia. The vomiting of amniotic fluid is usually pathognomonic.

Symptoms. The symptoms are those of acute intestinal obstruction in a newborn baby.

Diagnosis. The absence of meconium calls attention to the condition. Signs and symptoms of colonic obstruction occur directly. Sigmoidoscopic examination may be of value. A thin barium enema will demonstrate the obstruction, although this examination must be used judiciously, as in all cases of intestinal obstruction.

Treatment. Immediate operation is advised. Depending on the mobility of the sigmoid, an anastomosis around the obstruction or a Mikulicz type of procedure may be done. Bagley and Bagley[13] report a successful case in which the McGraw rubber band necrosis colocolostomy was done.

DUPLICATION OF COLON

A case of duplication of the colon (colon duplex) has been reported by Weber.[13] The diagnosis was made by roentgenographic study and exploration. Uteroduplex and cervicoduplex were associated. Two appendices had been removed previously. A second case had been previously cited by Lockwood[79] and still another by Ombredanne.[9]

TRIPLICATION OF COLON

Gray *et al*[46] reported a most unusual case of triplicate colon. A girl eleven months of age died of bronchopneumonia. Necropsy revealed two small apertures posterior and superior to the ileocecal valve opening freely into two completely distinct and dilated lumens lying in the posterior and medial wall of the dilated blind channel just described; the latter was paralleled throughout entire course by these two supernumerary colons. At the rectosigmoid junction instead of ending in a blind pouch, two additional channels passed medial to the cul de sac and entered into a single rectum through two patent orifices 5 mm apart; on section, both patent colons were of normal

size and of average thickness both contained fecal material All three lumens were lined by mucous membrane nowhere were there septal defects they extended as separated tubes from cecum to rectum

MICROCOLON

Microcolon is a very uncommon deformity nine cases having been recorded[41, 49-51] The involved colon is markedly narrowed its lumen in one case measured four mm in diameter The affected colon is elongated and tortuous The entire colon or only a part of it may be involved In about one half of the cases there are associated areas of stenosis of the small intestine In one case a localized stenosis of the rectum was also present

Symptoms The symptoms are those of obstruction They are modified if stenosis of the small bowel is present In one case abdominal distention appeared only prior to the fatal termination of a thoracic empyema The microcolon was found at necropsy[50]

Diagnosis McConahy[51] performed a barium enema on a patient with microcolon The lumen of the involved bowel measured four mm in diameter It was elongated and tortuous The wall was smooth and no haustrations were present The radiologic findings were comparable to those found in the spastic colon in adults

Treatment At present no form of treatment has been established inasmuch as the condition is extremely rare and seldom diagnosed prior to exploration and few cases necessitate operation unless complications are present

CHAPTER 3—PART 3

Megacolon—Hirschsprung's Disease

DEFINITION

Megacolon or Hirschsprung's disease is a congenital dilatation of the colon characterized by further dilatation and hypertrophy, usually affecting the sigmoid and occurring in the absence of a gross obstructive process Hirschsprung[illegible] mentioned two types, the infantile (true megacolon) occurring in children and the acquired (pseudomegacolon) which occurs in adults Rankin[104] is of the belief that possibly the latter condition (acquired type) has existed since infancy Megacolon is comparatively rare It has been estimated to occur once in 9 000 cases[31] It is of more frequent occurrence in males in the ratio of 6 to 1[139] and usually manifests itself as early as the first year, although it may not be recognized until a much later age, even until adult life is reached

Synonyms Hypertrophy of the colon congenital dilatation of the colon, idiopathic dilatation of the colon giant colon[37] Mya's disease[illegible]

Lockhart Mummery[9] observed the age

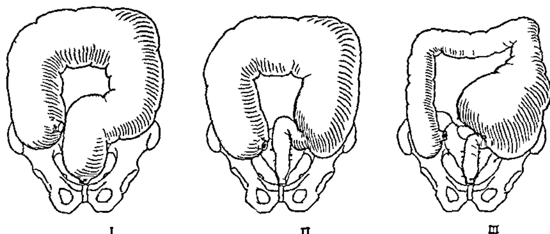


Fig 114 Three types of megacolon pathology encountered in twenty four patients (I) Twelve patients had uniform involvement of all the colon and a dilated or easily dilatable rectum (II) Seven patients had uniform dilatation of the proximal colon terminating in the sigmoid region in a normal segment of sigmoid colon and a normal rectum (III) Five patients had enormous dilatation of the upper sigmoid and descending colon with or without some dilatation of the proximal segments and a normal or dilated lower sigmoid and rectum (K Grimson)

incidence as shown in the appended table

Incidence of Megacolon by Age

Age	Cases
Under 5	1
5 to 10	16
10 to 20	14
20 to 30	11
30 to 40	7
40 to 50	8
50 to 60	5
60 to 70	6
Over 70	4
Not stated	5
Total	100

The site of involvement in 26 cases is listed by Whitehouse et al [133] as follows

	Cases
Rectum and sigmoid	4
Descending colon sigmoid and rectum	4
Descending colon and sigmoid	4
Transverse and descending colon and sigmoid	7
Ascending transverse and descending colon and sigmoid	4
Cecum ascending transverse descending colon sigmoid and rectum	3

In our group of 15 patients the involvement was noted as shown in the appended chart

Transverse descending colon and sigmoid	4
Descending colon and sigmoid	8
Descending colon sigmoid and rectum	2
Sigmoid and rectum	1
Total	15

ETIOLOGY

As may be noted by the chart prepared by Rankin [10] there is no unanimity of opinion regarding the etiology

Congenital defects (Hirschsprung Mya[9])
Obstructive processes
- Elongation of mesentery and consequent torsion of bowel segment (Barth[16])
- Elongation of entire colon and multiplication of number of loops (Martin)

Anatomic conditions
- Valve formation (Perthes Roser[111])
- Aplasia of musculature of colon (Concetti [4])
- Mechanical Obstruction (Treves[1 6])
- Congenital stricture of rectum (David [6])
- General systemic condition
- Diastasis of recti (Levi[77])
- Adhesions to surrounding structures (Murray[91])
- Wasting diseases (Griffith[47])

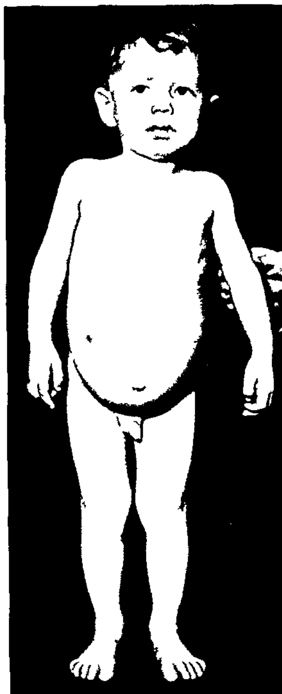


Fig 115 Hirschsprung's disease Note enlargement of abdomen

Nervous mechanism
- Segmental neuromuscular defect (Hawkins [50] Lennander [6] and Formad[37])
- Systemic system (Bing[18])
- Spastic contracture of sphincter ani (Fenwick[3])
- Spastic contracture of intestinal segment (Gee and Hutchins[43])

CHAPTER 3—PART 3

Megacolon—Hirschsprung's Disease

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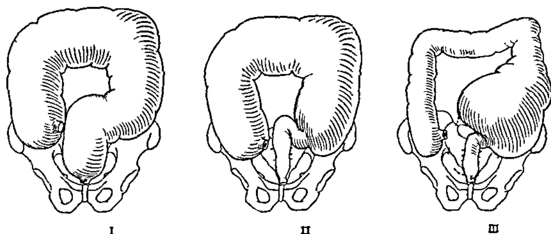


FIG 114 Three types of megacolon pathology encountered in twenty four patients (I) Twelve patients had uniform involvement of all the colon and a dilated or easily dilatable rectum (II) Seven patients had uniform dilatation of the proximal colon terminating in the sigmoid region in a normal segment of sigmoid colon and a normal rectum (III) Five patients had enormous dilatation of the upper sigmoid and descending colon with or without some dilatation of the proximal segments and a normal or dilated lower sigmoid and rectum (K Grimson)

of Auerbach and not in the extrinsic sympathetic system. In this line of reasoning, the histologic investigation of Lendrum,[75] and Knight,[64] who demonstrate a disintegration of Auerbach's plexus in the distal portion of the esophagus, is of interest. Additional references pertinent to this disturbance in the autonomic nervous system are to be found in the literature.[3, 14, 110, 119, 122, 127, 139] On the basis of therapeutic response to sympathectomy and from the use of stimulating and paralyzing drugs, Klingman[63] suggests four varieties of autonomic disturbances which may result in megacolon: (1) Diminished parasympathetic activity, (2) excessive parasympathetic activity, (3) diminished sympathetic activity, (4) excessive sympathetic activity.

According to Franz,[38] rhythmic segmentation is more or less continuous with but feeble co-ordinated peristalsis, and the absence of impulse to excite the act of defecation. This view is supported by the development of hypertrophy, which is almost wholly confined to the circular muscle layer. While the theory of faulty innervation of the longitudinal fibers of the colon explains many features of this curious condition, yet in all probability there is another embryonal defect to be considered, namely, the failure of fusion of the embryonal mesosigmoid with the parietal peritoneum. This defect obviously would explain the redundant and elongated sigmoid and persistent mesosigmoid present in many of the cases. Although colitis has been cited as an explanation of megacolon,[130] it is generally considered that this inflammatory process is secondary to, and not the actual cause, of the condition. Degeneration in the autonomic nervous system as a result of vitamin B_1 deficiency has been under discussion in its relationship to megacolon and megaureter.[3] Scientific investigations of this subject would invite interest.

Anatomic Considerations. Discussion pertinent to megacolon from an anatomic standpoint may be found on page 35 (Chap. 1, Anatomy).

PATHOLOGY

Grossly, the abdomen is markedly enlarged and is virtually filled by the distended portion of the intestine. Most frequently the sigmoid is the site affected,[93] although the colon may be involved in part or in its entirety.[80, 139] While not universally involved, the rectum shows some degree



Fig. 118 (*Left*). Hirschsprung's disease. Low power section through the wall of the sigmoid colon. Note the extreme thickening of the muscular coats especially in the circular layer. (E. S. Gault.)

Fig. 119 (*Right*). High power section through the circular muscle coat showing marked hypertrophy. There is a moderate excess of round cells denoting inflammation.

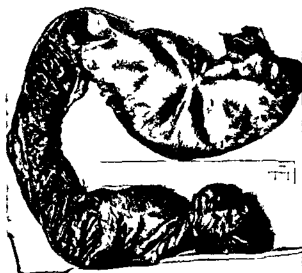


Fig 116 Gross specimen showing rubberized thickening in a case of megacolon

Scott and Serennati[115] have utilized a practical classification for diagnosis and clinical management (1) organic obstruction (congenital) (2) neurogenic dysfunction (3) functional obstruction (dolichocolon) (4) extrinsic metabolic effects

While the exact cause of this condition is unknown there is general agreement that no single etiologic factor is responsible for all cases It is not the purpose of the author to evaluate or describe in detail the numerous theories promulgated by various authors but rather to present in brief those which are more generally accepted and are of most significance

True Megacolon (Hirschsprung's disease) and Acquired or Pseudomegacolon True megacolon in general is essentially a congenital defect [8 1 8] or pathologic fetal process,[30] whereas pseudomegacolon, or that occurring in adults is usually due to some type of obstruction,[94] as a stricture or neoplasm [60] That an obstructive process may be a late manifestation of a congenital anomaly accentuated by chronic intestinal stasis has been expressed [101] The valve theory,[111] which embodies excessive mucosal redundancy, is of little moment, *though it has been borne out experimentally* That there may exist a functional obstruction similar in nature to reversed peristalsis has been mentioned [1] Probably the most logical explanation is that of Lockhart Mummery, who states, Apparently there is some congenital abnormality which causes a partial or intermittent obstruction, and the dilatation and hypertrophy are secondary to this' Spasm of the sphincter at the rectosigmoid junction has been referred to as a cause of megacolon [39 41] as have congenital, [4 8] and acquired stricture[8 54] and narrowing of the rectum [0 1 131] Angulation of the sigmoid kinking volvulus,[16 133] redundancy and adhesions have been mentioned as etiologic factors The neurogenic theory is expressed in an original treatise by Formad [37] who attributes this condition to changes in the sympathetic innervation of the longitudinal muscle layers of the colon Ladd and Gross[67] are of the opinion that either the parasympathetic innervation is deficient or else the sympathetic apparatus is overactive According to Jordon and Swarts, the pathology may originate in the plexus



Fig 117 Hirschsprung's disease showing distention of abdomen

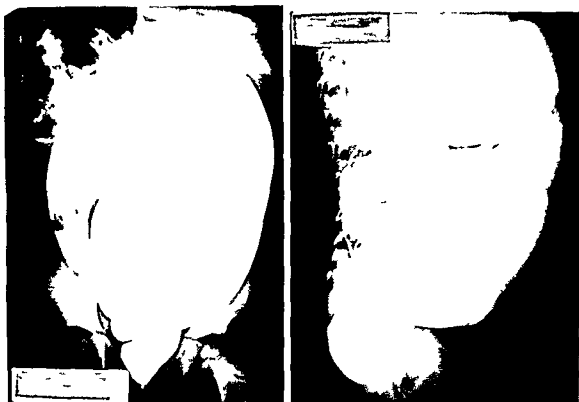


Fig 121 B K Opaque enema demonstrating enormous distention Lateral view

failed to demonstrate changes in the innervating apparatus. Adamson and Aird[1] did observe, however, increase in the epineural tissues rather than numerical increase in the fibers.

Concomitant or Associated Processes with Megacolon Many instances of megaureter and volvulus[16, 90, 133, 136] have been reported. Unusual cases with associated reduplication of the colon,[46] malignancy[137] and aortic aneurism[118] have been cited.

SYMPTOMS

Progressive enlargement of the abdomen and constipation of the obstinate type is usually cited by the parent or patient. Constipation is not uncommonly the first symptom. In some cases the meconium may be delayed for several days, while in others retardation of the fecal flow may extend over a period of several weeks, unrelieved by cathartics or repeated enemas. Occasionally the constipation may alternate with diarrhea. Not infrequently attacks of diarrhea are noted—often spontaneous. Most important is the enormous enlargement of the abdomen. After weeks or even months the distention may be relieved by bowel action only to be followed again by a similar occurrence. Although infrequent, attacks of abdominal pain, colicky in type, may occur and increase with the degree of distention. Borborygmus, explosive in character and distinctly audible, is one of the most marked symptoms. Shortness of breath becomes pronounced in the course of the disease, and is in proportion to the amount of pressure exerted by the distended bowel against the liver and diaphragm causing encroachment upon the lungs. In such cases the breathing is costal. Circulatory embarrassment similarly may occur from cardiac displacement. Vomiting is unusual, but signs of intoxication may develop from absorption of the retained products, with resulting anorexia, fetid odor to the breath, hypochromic anemia,[6] lassitude, loss of weight and emaciation.

of dilatation and thickening in most cases

Even though a definite obstructive process may not be demonstrable at operation[2, 126] it is generally considered to exist (Figs 118, 119) The submucosa shows an increase in connective tissue elements and in the number of blood vessels, while little change is seen in the serous (peritoneal)



Fig 120 Roentgenogram showing enormous dilatation of the colon

In Lockhart Mummery's series, 23 per cent showed obstruction As a result of the occlusion whether anomalous or acquired, dilatation and hypertrophy with hyperplasia occur above the obstruction and this constitutes, in the main, the pathologic picture of megacolon[8] (Fig 116) Although it cannot be stated with certainty which condition is primary it seems rational to assume that if the obstruction is acute, dilatation is immediate and because of the increase in work done, is followed by hypertrophy

On section the intestinal wall is found to be firm and thick and feels leathery Most characteristic is the muscular coat which is markedly thickened and hypertrophied, especially the inner circular layer coat The mucosa may present little or no change, although at times it is greatly exaggerated and thrown into folds Ulceration, however is not uncommon The mesentery is usually short and considerably thickened with dilatation of the lymph and blood vessels, together with enlargement of the glands Retained meconium or fecal material, the result of obstruction, undergoes bacterial decomposition followed by fermentation, and this adds to distention of the gut Therefore, upon opening the dilated portion of the intestine flatus and feces are noted, the latter presenting variations in color, as yellow, green or brown, and differing in consistency from puttylike softness to inspissated masses Most reports have

ment and bronchopneumonia, may be mentioned as additional complications

PROGNOSIS

Records show that, in the past, the majority of children succumbed before the age of puberty yet more recent reports present evidence that with proper care and the utilization of newer medical and surgical procedures the mortality rate is materially decreased

TREATMENT

Nonsurgical

Assuming appropriate studies have been made and the diagnosis confirmed measures designed to evacuate the contents of the bowel are instituted Enemas of olive oil, milk and molasses magnesium sulphate 50 per cent, hydrogen peroxide from 10 to 20 per cent, or glycerine are given daily Our preference is a retention enema of olive oil at night milk and molasses the following morning and magnesium sulphate in the afternoon for the first two days One daily irrigation is continued thereafter Liquid petrolatum is administered orally twice or thrice daily In many instances some improvement may be noted High colonic irrigations have been recommended to procure daily evacuations Drastic purgation is to be avoided since injurious effects may result *Abdominal massage especially of the* colon physiotherapy hot fomentations and bandaging the abdomen have also been recommended as palliative procedures A few reports are available where diathermy has been successfully employed[6, 4, 7, 8, 9] Occasionally hard fecal accumulations, previously softened by the injection of warm olive oil, may be broken up manually and extracted by spooned forceps

Anal Dilatation Not infrequently, an irritable or spastic sphincter muscle is associated with megacolon The use of any type of commercial dilator such as hard rubber or metal is to be decried Our practice is to instruct the parent preferably the mother to introduce the gloved index finger using



Fig 122 Abdominal distention present in a 15 year old megacolon patient It had progressed from the time of birth The colon ruptured spontaneously two years later and the patient died The normal rectum and lower sigmoid colon of this patient resisted evacuation efforts Colon resection and ileosigmoidostomy were anatomically impossible (K Grimson)

a water soluble lubricant into the rectum night and morning Warm mineral or olive oil one ounce may be instilled after the finger is withdrawn Hurst[5] was probably the first to recommend this procedure as a primary form of treatment More than 70 per cent of his 32 cases however, were in their fourth decade of life and therefore should probably be classified as acquired megacolon

Intestinal intubation has been employed with success in severe cases As is our custom in all cases following resection[10] inhalations of high concentrations of oxygen

DIAGNOSIS

The salient features in the diagnosis may be enumerated as follows (1) the early age of the child, (2) obstinate constipation, not relieved by cathartics and only occasionally by repeated enemas (3) the enormous distention of the abdomen, which is uniform, shiny and glistening in appearance (diastasis of the recti and distention of the superficial veins may be noted) (4) uniform tympany on percussion with liver dullness diminished or absent owing to elevation of the diaphragm (5) change in the costal angle and plane of the chest wall,[36] (6) visible palpable[171] and audible peristalsis (7) digital examination which may, if the rectum is involved present a stricture or fecal impaction (8) proctosigmoidoscopy which may reveal an obstruction a deformity or an immense sac (9) roentgenogram after a barium enema which enables the dilated bowel to be visualized (Fig 122) This unquestionably is the most valuable aid in establishing a diagnosis Dyspnea and edema of the lower extremities may be present in severe cases

DIFFERENTIAL DIAGNOSIS

The diagnosis of megacolon is not usually difficult, but occasionally it becomes necessary to distinguish this condition from the ascitic form of tuberculous peritonitis, celiac disease, rickets, chronic ileus, ovarian cyst and malignancy A careful history complete physical examination and thorough roentgenologic study should offer little doubt as to the diagnosis

COMPLICATIONS

Intestinal obstruction is the most frequent complication, although fecal impaction, colitis, volvulus and perforation followed by peritonitis may occur Deformity of the bladder and hydronephrosis should be cited also Intercurrent affections, as intoxication due to stasis, cardiac embarrass

TABLE 2 DIFFERENTIAL DIAGNOSIS

	Hirschsprung's Disease	*Rickets*	*Tuberculous Peritonitis*
Age	Shortly after birth Acquired type in adults	After first month	Older children
Etiology	Congenital anomaly or obstructive process	Deficiency of lime salts in bones Italians and Negroes show predisposition	Tubercle bacillus
Symptoms of history	Obstinate constipation not relieved by cathartics Duration several days to 3 months	Constipation restlessness irritability excessive perspiration	Abdominal pain diarrhea fever loss of appetite
Characteristics	Enormous distention of abdomen uniform glistening and shiny Visible audible and palpable peristalsis Liver dullness diminished or absent	Distention of abdomen pot belly areas of dullness present	Distention and ascite Dullness on percussion
Associated findings	Anemia and emaciation	Bony change localized thinness in occipital and parietal bones — craniotabes Enlargement of epiphysis—usually at costochondral joint Rachitic rosary pigeon chest Harrison's groove Muscles show degenerative changes curvature of spine and deformity	Enlarged glands Cachexia Tuberculin test strongly positive
Proctosigmoidoscopy	May show stricture deformity sac	Negative	Negative*
Roentgenogram	Visualization of dilated bowel	Shows bony changes	May show enlarged lymph nodes

* Usually

since cellulose is resistant to digestive ferments. It absorbs water and, when acted upon by the intestinal bacteria, mixes with the other fecal matter to form a stool of soft consistency.[41] The consumption of plenty of water and the regulation of the hour of stool are helpful adjuncts. Since the newborn progresses more rapidly when breast fed, it is advisable to continue the procedure when possible.

Chemotherapy. Many drugs have been employed in the treatment of megacolon for the most part on a trial and error basis. Recently much interest has been given the newer parasympathetic stimulants, especially mecholyl (acetylbetamethyl choline chloride) and mecholyl bromide (acetyl beta methyl choline bromide). Law[3] recommends mecholyl bromide administered in dosage of from 0.1 to 0.2 Gm after breakfast and increasing the amount to 0.2 Gm in two or three days. If well tolerated, an afternoon dose of similar amount may be given. Should diarrhea occur, the drug is diminished. Liquid petrolatum is given nightly in one half to one ounce quantities. Kendall[6] suggests that mecholyl bromide should be given twice daily rather than one dose after the morning meal. Satisfactory results were obtained by Law in six cases

TABLE 3 ABDOMINAL DISTENTION (Barenberg and Greene)

Therapy	Duration (Days)	Dosage	Effect
Thyroid	90	1/10 gr T I D to 1 gr daily	None
Pituitrin	1	0.2 c c subcutaneously	None
Atropine	2	1/1000 gr A C	None
Pituitrin and mineral oil	18	5 min B I D 1 tbs daily	Good bowel movement daily, abdomen soft, slight distention
Pituitrin	38	5 min B I D	Good daily bowel movement, moderate distention
Enemas	579	Once in 2 weeks	Bowel movement every other day, abdomen distended but soft
Pituitrin and thyroid	53	5 min B I D 1/10 gr T I D	None
Syntropan	64	15 mg increased gradually to 130 mg daily	At 45 mg good effect for four days and then none
Prostigmine bromide	2	15 to 30 mg daily	None
Pituitrin	19	5 min B I D	Good bowel movement daily, moderate distention
Mineral oil	103	1 to 2 tbs daily	Good
Pituitrin	16	5 min B I D	None
Syntropan	37	45 mg increased gradually to 150 mg daily	None
Depropanex	7	0.3 to 0.5 c c I M every other day	None
Thyroid	90	1/4 gr T I D increased gradually to 3 gr daily	None
Pitressin	17	2 min B I D subcutaneously	None
Acetylbetamethylcholine chloride (mecholyl)	5	1 mg subcutaneously	Marked peristalsis, bowel movements on three occasions, distention unaffected, temporary effect
Mecholyl and prostigmine methylsulfate	1	1 mg subcutaneously 1/4 mg subcutaneously	Marked peristalsis, large bowel movement, great decrease in distention, temporary relief
Prostigmine bromide	14	7.5 mg increased gradually to 45 mg daily by mouth	None
Acetylbetamethylcholine bromide (mecholyl bromide) and mineral oil	120	100 mg increased gradually to 200 mg B I D, then gradually decreased to 200 mg daily; 1 to 2 oz daily	At least two to three good bowel movements daily, abdomen soft and not distended

may be employed to facilitate the absorption of nitrogen from the bowel by diminishing the nitrogen tension in the blood plasma

Diet The diet in these cases should be nutritious easily assimilated and nonfermentative leaving but little residue The most important object is to improve the general health of the patient, therefore foods that are of the wholesome type are selected to maintain body weight and vitality Fecal masses which are hard, dry and concentrated are irritating, and tend to accumulate in the haustrae where they remain for long periods of time To avoid this, McLester[37] suggests that the dietary consist of those foods which are rich in cellulose, as fruits and green vegetables,

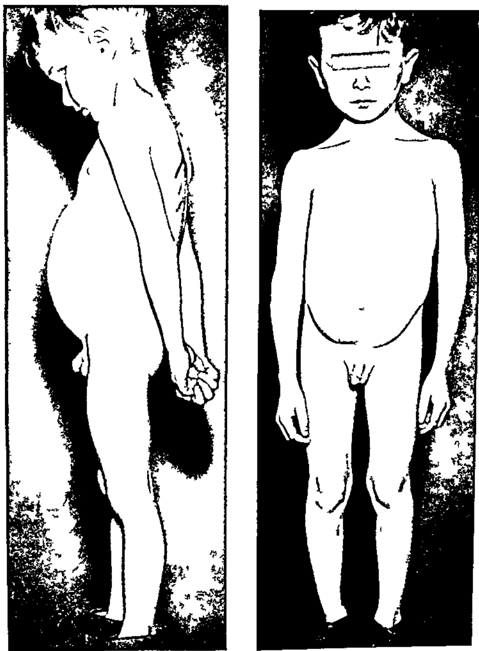


Fig 123 B C, age 7 Hirschsprung's disease associated with rectovesicoperineal fistula and anal stenosis Successful repair of fistula and correction of anal stenosis by Martin anoplasty resulted in disappearance of abdominal distention

The baby showed immediate improvement on this regimen Bowel movements increased to one every two and one half days After two months the dose was increased to 5 mg T I D then further increased to 37 mg daily in divided doses

On May 2 abdomen was still distended but measured 20 inches in circumference a decrease of 4 inches since April 18 At this time bowel movements were reported to be larger than previously and occurring every two days

Therapeutic Tests Scott and Morton[116] in 1930, cited their experience in a single case of megacolon in which spinal anesthesia prior to sympathectomy was used Since that time the procedure has been employed in innumerable instances as a therapeutic test to determine the suitability of cases for sympathectomy Marked improvement of symptoms has been observed in the motor function of the bowel Stabins et al[120] report a series of five cases and recommend the use of spinal anesthesia not only to demonstrate the sympathetic overactivity, but as a conservative therapeutic measure Rives and Strug[107] cite two cases and Telford[131] seven cases, four of which were completely and three almost completely cured over a period up to two years Usually one or more copious evacuations occur within the ensuing 24 hour period which phenomenon is regarded by Penick[99] as proof that expulsive power exists This is, therefore, considered a good omen, particularly if sympathectomy is contemplated Satisfactory results were obtained by Hawskley[1] in twelve instances Martin[illegible] mentioned that 75 per cent or more of the symptoms were eliminated, as well as shrinkage of the dilated colon Another method recommended by de Takats,[30] which he employed in three of his ten cases, is to stimulate the pelvic parasympathetic outflow instead of inhibiting the sympathetics A three fourths ampule of acetyl choline bromide in children or one whole ampule (0 1 cc) in adults produces prompt evacuation of the barium if muscular power is available As an alternative, mecholyl, 10 mg may be given Following the slow institution of barium diluted with equal amounts of petrolagar the first x ray film





Fig 125 (*Left*) Infant at 8 months (*Right*) X ray following barium enema showing stenosed sigmoid and gas filled bowel above the obstruction (Bagley & Bagley)

and Peterman[99] in eight, although Whitehouse[13] observed no evidence of improvement in three The chloride derivative of mecholyl may be given by injection, but adjustment of the dosage without causing



FIG 124 B K, age 4 Profile of abdomen showing distention Patient responded to prostigmine

toxic symptoms has been difficult for clinical use Satisfactory results, however, were obtained in five of nine cases reported by Law [7] That the employment of these drugs namely, mecholyl and its derivatives, which are parasympathetic stimulants, should offer beneficial results in the treatment of megacolon is difficult to interpret when similar reports from the use of a parasympathetic depressant are available such as syntropan Its action is not unlike that of atropin Larkin [1] cites an instance in which 150 mg were given thrice daily A satisfactory result was obtained with syntropan in a case which previously had failed to respond to prostigmine and mecholyl Klingman[63] noted improvement in five cases Our experience with syntropan is extremely limited Laning used it unsuccessfully in only one case In discussing dosage, however, it may not be amiss to mention that, in the postoperative management of vesical dysfunction, McCrea and the author[10, 11, 8, 83] have employed syntropan in a large group of resections, using 200 mg thrice daily It has been routinely utilized for more than three years in conjunction with prostigmine, following low anorectal operations Two hundred milligrams are given orally thrice daily (600 mg) with no untoward symptoms although, in 75 mg dosage subcutaneously nausea, vomiting, abdominal cramps and headache were encountered As much as 3200 mg was employed by Schlesinger and Alpers If syntropan is employed a trial dose of 25 mg thrice daily may be used Favorable reports are available with prostigmine alone or in combination with ergotamine [11, 85, 88] Other preparations employed are benzedrine, ephedrine sulphate, beta methylcholine urethane and furmethide Barenberg[14] and Greene have listed their results with various drugs upon abdominal distention in Table 3

Baby G B Male Age 3 Patient was referred on October 9 1946, with chief complaint of constipation and prolapse of rectal mucosa According to the mother s statement, constipation was noted upon arrival home following delivery Enemas and laxatives were employed with no effect Between the age of three and six months the constipation increased in severity Vomiting and attacks of colicky pains not infrequently occurred

Examination revealed a poorly nourished undersized white baby with moderately distended abdomen Peristalsis was normal Anal examination revealed minimal degree of eversion and slightly increased sphincter tone Proctoscopy revealed considerable prolapse of rectal mucosa

Barium enema showed a tremendously long, dilated pelvic colon with fairly good tone and wall flexibility

DIAGNOSIS Dolichocolon

TREATMENT Prostigmine 5 mg B I D instillation of warm mineral oil into rectum at night introduction of mother's finger into anus morning and night

superior mesenteric artery to a point below the inferior mesenteric artery Thereafter the mesenteric trunks divide to form a portion of the inferior mesenteric and the presacral nerve (superior hypogastric plexus) The colonic splanchnic nerves which are distributed to the upper rectum sigmoid, descending colon and distal transverse colon are frequently derived from a large trunk formed from the right and left intermesenteric nerves as they meet slightly below the inferior mesenteric artery In part the presacral or superior hypogastric plexus is formed by union of the right and left intermesenteric nerves Branches from the fourth lumbar sympathetic ganglia are insinuated into this plexus in most instances The superior hypogastric plexus (presacral nerve) courses inferiorly in the midline toward the pelvis and by dividing into two branches forms the middle hypogastric plexus Continuing in its descent it divides into a left and right hypogastric at the level of the first and second sacral vertebrae to form in part the inferior hypogastric plexus (See p 36 Anatomy)

The inferior hypogastric plexus is in relation to the middle hemorrhoidal arteries as they arise from the hypogastric artery in the lateral aspect of the pelvirectal space These two divisions of the hypogastric plexus are referred to as the left and right pelvic plexuses and supply sympathetic fibers to all the pelvic viscera

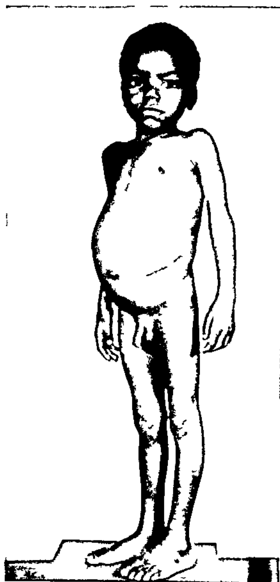


Fig 128 R T Notice enormous dilatation of abdomen Bilateral sympathectomy with no effect

Indications and Contraindications for Sympathectomy Penick[95] has listed the indications and contraindications for left lumbar sympathectomy as follows (1) the history should be compatible with the diagnosis of congenital megacolon (2) mechanical obstructions must be ruled out by roentgenographic studies therapeutic tests and other examinations (3) persistent dilatation of the bowel must be demonstrated by radiographic studies following the administration of a barium enema (4) failure or partial failure of medical treatment (including newer drugs) must have been demonstrated (5) the therapeutic test must be positive however a negative result from the injection of a spinal anesthetic or parasympathetic stimulants is not known to be a definite contraindication to sympathectomy although in some instances it has proved to be an omen of failure, and (6) sympathectomy on patients less than two and one half years of age is contraindicated unless it is felt that this might be a life saving measure

Sympathectomy is based on the original idea that megacolon is due to changes in the sympathetic innervation of the colon It is generally considered that the musculature of the rectum and colon derive their



Fig 126 G B male, age 3 Roentgenogram showing enormous dilatation of colon and rectum with malposition—dolichocolon

is taken Forty five minutes after the subcutaneous injection of acetylcholine a second film is obtained

Surgical

When nonsurgical measures fail to relieve the condition, operative intervention is indicated In the presence of obstruction and when the colon is loaded with feces radical surgery is dangerous, so that it is preferable to choose methods of decompression namely, appendicostomy, cecostomy ileostomy or colostomy Such may be performed as a preliminary step to resection

Sympathectomy As early as 1895 Langley and Anderson[69] showed that inhibition of peristalsis was caused by stimulation of the sympathetic ganglia The first reference to the performance of lumbar sympathectomy is by Wade and Royle,[113 119] with subsequent reports by others[3 4 3 4 2 6 57 61 4 96 108 109 115 117 125 134]

Anatomic Considerations The motor and sensory (*efferent*) impulses of the sympathetic division of the vegetative nervous system are considered to be conducted along the preganglionic neurons, the cell bodies of which are located in the lateral horns of the gray matter These axons of the preganglionic fibers are medullated and constitute the white rami communicantes as they leave the anterior spinal root Some of these fibers pass through the paravertebral sympathetic ganglionic trunks and form a synapse with the dendrites of the postganglionic cells The inferior mesenteric and hypogastric ganglia are less constantly present The superior mesenteric ganglia, usually two in number, are located on the anterior surface of the aorta at the origin of the superior mesenteric artery The intermesenteric plexus descends on the anterior surface of the abdominal aorta, from the origin of the

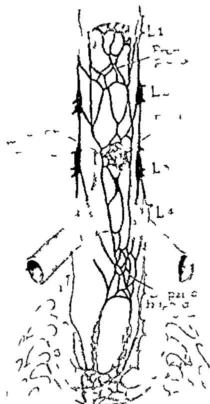


Fig 127 Schematic drawing showing portions of the sympathetic nervous system from which the innervation of the colon is derived Portions shown in black should be removed for complete denervation of colon in treatment of congenital megacolon (Herrmann L G The management of *megacolon* [Hirschsprung's disease] S Clin North America)

nerve supply from the inferior mesenteric plexus through its inferior hemorrhoidal branches, and from the two pelvic plexuses which, in turn are derived from the hypo gastric plexus These fibers convey inhibitory impulses to this portion of the intestine Overactivity of these nerves may result in dilatation of the rectum and colon and contractility of the internal sphincter as proved experimentally by the work of Learmonth and Markowitz [4] The original operation outlined[179] relieved the dilatation but interfered with the vasomotor control to the lower extremities The method as modified by Rankin and Learmonth[10, 101] consists of a transperitoneal division of the inferior mesenteric and presacral (hypo gastric) nerves which are inhibitory to the rectum and colon At the same time the motor nerves to the internal sphincter are severed The advantage of this technic is that the vasomotor control of the lower extremities is retained

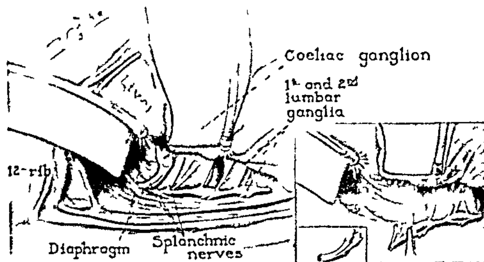


Fig 131 Exposure and resection of splanchnic nerves with a portion of the celiac ganglion and removal of the first and second lumbar ganglia (Adson A W Hirschsprung's disease indications for and results obtained by sympathectomy Surgery 1 867)

Technic Since the inferior mesenteric artery arises opposite the third lumbar vertebra and the presacral nerve is found to be in front of the fifth lumbar vertebra full exposure of these structures may be obtained through a left paramedian incision 15 cm long and centered on the umbilicus The small bowel is packed off upward and to the right so as to expose and pull upward the root of its mesentery The sigmoid colon is drawn aside in order to expose the bifurcation of the aorta The peritoneum is picked up in the midline and incised vertically from the level of the promontory to the origin of the inferior mesenteric artery (Fig 131) The two edges of this incision are displaced by forceps to each side The strands of the presacral nerve are not adherent to the membrane, and posteriorly they are separated from the great vessels by a layer of fine connective tissue

The nerve is first divided below at the right border of the left common iliac vein it is well to place a ligature on its distal end as this is usually accompanied by a small artery It is then raised by gentle dissection and the branches which reach it from the fourth lumbar ganglion are divided on each side Immediately below the bifurcation of the aorta the connecting branches from the third lumbar ganglion are divided as they pass to join the nerve from beneath the common iliac arteries When the nerve has been raised a little higher its lateral roots formed by the union of branches from the first and second lumbar ganglia may be severed the middle root is preserved if

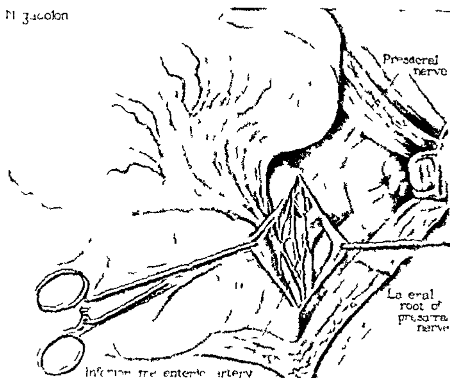


Fig 129 The field of operation After division of the presacral nerve the inferior mesenteric nerves were removed by dividing them at the points indicated (Rankin and Learmonth Ann Surg 92 710)

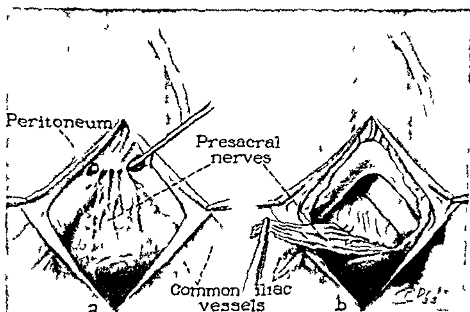


Fig 130 (A) Elevation of presacral nerves as they cross the bifurcation of abdominal aorta (B) Illustrating the method of presacral nerve resection (Adson, A W Hirschsprung's disease indications for and results obtained by sympathectomy, Surgery 1 865)

In the main much depends on the choice of the surgeon who should be guided by the particular case under observation The technic of operation has been described elsewhere

Colectomy with ileosigmoidostomy or ileoproctostomy may be utilized in intractable cases where the entire colon is involved An interesting case is reported by Stone[127] in which he performed a pull through type of resection which we term proctosigmoidectomy for megacolon in a patient 38 years of age In a recent experimental study entitled *Resection of Rectum and Rectosigmoid with Preservation of the Sphincter for Benign Spastic Lesions Producing Megacolon* Swenson and Bill[141] evaluated their results in 15 dogs The operation was successfully used in three in years and in whom the defect is confined to the pelvic colon In cases where the involvement is confined to the left colon, left hemicolectomy with proctosigmoidectomy and transplantation of the transverse colon to the anal aperture may be employed[1]

Mortality Rate

The mortality rate from medical treatment was computed by Puls[101] as 64 per cent and by Lowenstein[81] as 66 per cent Unfortunately statistics following the use of the newer parasympathetic stimulants and depressants are not available other than those which have been mentioned Babcock[9] and Schneiderhohn[114] cite a mortality of 20 and 36 per cent, respectively, after operation A number of reports are appended in the accompanying table

Table 5 Results of Resection

Author	Ref	Year	No Cases	Cured or Satisfactory	Failed	Deaths	Per Cent Mortality
Ladd and Gross	67	1941	10	8	1	1	
A K Upmark	8	1930	27				
Gutierrez	49	1942	114				19 4 (Total Colectomy)
Ladd and Gross	67	1941	3	2		1	66
Yeazell and Bell	138	1943	6	5	1	0	0
Whitehouse Bargen and Dixon	135	1943	29	16	6	7	24
Cattell and Colcock	23	1946	4	3		1	25
Anschutz	7	1931	20	16		2	10
Grimson Vandergrift and Dratz	48	1945	4	4		0	(Total Colectomy)
Patel	97	?	105	57			(Total Colectomy)
Lowenstein	80	1907	44	15	7		48 (Total Colectomy)
Carey (Collected Cases)	22	?	95				27 (Subtotal Colectomy)

children With a personal experience of 434 resections for various conditions such as cancer inflammatory stricture diverticulitis chronic ulcerative colitis and rectosigmoidal endometrioses the author does not hesitate to institute proctosigmoidectomy as a logical approach in selected cases considering the excellent results obtained by preservation of the sphincter musculature By selected cases one would include those persons past their first decade

Dixon and Judd[140] list their results following resection as shown on page 118

SUMMARY

The management of megacolon depends on many factors, among which may be mentioned the severity of the symptoms, the age of the patient and the methods of treatment previously employed Although our knowledge of this condition is extremely meager, and any attempt to offer a plan of

possible, to be used as a guide to the inter mesenteric plexus The trunk of the inferior mesenteric artery is identified by tracing upward the middle root of the presacral nerve the operator reaches the two large principal roots of the inferior mesenteric plexus, one on each side of the vessel and joining it 1 5 cm below its origin If the middle root of the presacral nerve cannot be used as a guide the main trunks of the inferior mesenteric plexus will be found at the positions of five and seven o'clock with reference to the origin of the artery About 2 5 cm of each is then resected, if any ganglionic mass is present on either it must be included in the resected portion Any subsidiary periarterial strands are then sought for if any are found they are divided *Bleeding is not to be expected during this part of the operation* The inferior mesenteric vein is too far to the left to appear in the field The incision in the posterior peritoneum is brought together with a continuous suture of catgut and the abdominal wound is closed in the usual manner

Adson* found resection of only the first and second lumbar ganglia of value, particularly in moderately severe cases and resection of the inferior mesenteric nerves in conjunction with resection of the presacral nerve in moderately advanced cases He and Judd[71] prefer bilateral sympathetic ganglionectomy, which includes removal of the second, third and fourth lumbar ganglia with the intervening trunk More recently, wide resection of the superior hypogastric plexus, presacral nerve, is included (See Fig 133)

The results of sympathectomy from several sources are tabulated

TABLE 4 RESULTS OF SYMPATHECTOMY

AUTHOR	REF	YEAR	NO CASES	GOOD	IMPROVED	FAILED	MORTALITY
Ross	112	1935	29	21	7	1	0
de Takats	30	1938	2		0	0	0
Passler (collected)	96	1938	117	38	64	17	3
Barrington Ward	15	1939	10	8	0	0	0
Telford	123	1939	9	6	2	1	0
Penick	98	1944	11	7	3	1	0
Ladd and Gross	67	1941	6	2	4	0	0
Cattell and Colcock	23	1946	2	0	0	2	0
Total			186	84	80	17	3
				(45 2%)	(43 0%)	(9 1%)	(1 6%)

Dixon and Judd[140] report the results achieved in 25 cases as follows

RESULTS FOLLOWING SYMPATHECTOMY

PROCEDURE	PATIENTS TRACED	RESULTS GOOD	FAIR	NO IMPROVEMENT
Bilateral lumbar sympathectomy	5	0	3	2
Bilateral lumbar and presacral neurectomy	10	0	4	6
Bilateral resection of splanchnic celiac and first and second lumbar ganglia	6	0	0	6
Resection of presacral and inferior mesenteric nerves	2	1	1	0
Total	23	1	8	14

Obstruction As previously mentioned, intestinal obstruction and severe distress necessitate surgical decompression Any attempt at radical extirpation in the presence *of obstruction is a hazardous and formidable* procedure and therefore is not to be recommended

Resection Resection of the involved segment of bowel and end to end anastomosis, the exteriorization method of Mikulicz or the obstructive type of resection by Rankin may be employed Each is a standard procedure and each has its advocates

CHAPTER 3—PART 4

Megarectum

Megarectum is an extremely rare anomaly. A meticulous review of the literature failed to disclose a single instance in which the rectum alone was involved. The late J Rawson Pennington cited several cases, but all were associated with dilatation of the proximal bowel as customarily encountered.

An unusual case of an enormous megarectum without involvement elsewhere recently was referred to us for treatment. Although the outcome was an unhappy one since the youngster died following extensive surgery, the case is reported here because of its rarity.

Case Report Master P J aged four and one half years. Patient seen in consultation because of long history of fecal incontinence and a rather remarkable psychiatric disturbance stemming from infantile aggressions. He was born with an imperforate anus and operated upon six hours after birth. No films were obtained. The attending surgeon recorded that he was discharged with a well functioning bowel. In the intervening years he had three other operations for stenosis of the outlet, and was finally referred for surgical correction of the incontinence. The reason was that he was mentally deficient and the appropriate institution would not accept him with incontinence or a colostomy.

Physical examination on admission 10 14 47 showed a well nourished child approximately the stated age of four years and nine months and not appearing mentally deficient. There were abrasions on his wrists where he had been restrained at night at home to prevent his turning on the gas etc. The examination except for abdomen and anus was essentially normal. The abdomen was distended for a child of this age, rather firm to palpation and flat to percussion suprapubically. The anus was the site of extensive scarring, presented little muscle tone, was patulous, and the rectum was packed with soft feces.

Blood and urine studies were within normal limits. Barium study of the colon revealed a "Megarectum of huge proportions," extending to the diaphragm with rapid diminution in size at the rectosigmoid junction.

Psychiatric consultation was obtained and the conclusion drawn that he was subnormal in intelligence. It was decided that he would require institutionalization and psychiatric follow up so that surgical correction of the incontinence seemed to be even more clearly indicated.

Consequently the patient was subjected to abdominoperineal proctosigmoidectomy, during which the huge rectum was seen to occupy most of the abdomen. Normal pelvic colon was present in its usual location confirming the diagnosis of megarectum.

The ureters were easily located apparently having been pushed laterally and anteriorly along the peritoneal reflection of the expanding rectum. In the perineal phase the scarred perineal skin was excised circumferentially and the bowel pulled down and amputated distal to a Daniel clamp leaving seven centimeters of distal sigmoid at the perineum. The operative procedure lasted two hours and thirty minutes. At the close of the operation which was under vinethene induction ether and oxygen the patient's condition as recorded by the anesthetist was "fair." During the operation the patient received 200 cc whole blood in the antecubital vein but it was discontinued and not begun again by the anesthetist. Preparations were made to continue blood on the ward via cannulation of the anterior malleolar vein of the ankle. One hour and a half later after heroic attempts at artificial respiration and administration of blood by cut down, he was pronounced dead. At autopsy the gross pathology was compatible with the clinical diagnosis of surgico-anesthetic shock with pallor of the renal cortices and cerebral cyanosis. Tracheobronchial tree and lungs were clear and the

RESULTS FOLLOWING RESECTION OF THE BOWEL FOR MEGACOLON (Dixon and Judd)

PROCEDURE	PATIENTS TRACED	RESULTS GOOD	FAIR	NO IMPROVEMENT
Exteriorization	27	21	6	0
Primary anastomosis	8	7	0	1
Mikulicz	6	6	0	0
Ileosigmoidostomy and subsequent resection in three stages	1	1	0	0
Ileosigmoidostomy exclusion of colon	1	1	0	0
Total	43	36	6	1

therapy will necessarily invite adverse criticism it is deemed expedient to suggest some method of approach The patient *should be carefully observed and studied* from a diagnostic viewpoint For patients under the age of three years conservative measures should be employed In all cases a trial period using one of the parasympathetic stimulants preferably mecholyl bromide seems warrantable It must be realized that interpretation of the effects of spinal anesthesia is equivocal since the parasympathetics as well as the sympathetics may be affected Nevertheless, spinal anesthesia for trial is recommended as the *next step If no improvement is observed* after a period of from three to four months, one may select sympathectomy even though it may be on an empiric basis Here a left lumbar sympathectomy should be done The response obtained should then determine whether right lumbar sympathectomy is justified Resection should be reserved for cases of failure from radical splanchnectomy



FIG 132 Megacolon Preoperative decompression efforts had failed The arrow indicates the short segment of normal sigmoid colon removed together with the megacolon (K Grimson)

Fig 133—(*Continued*) We find no unusual enlargement of any portion of the colon visualized proximal to the rectum Re examination after evacuation shows that most of the enema was expelled The rectum, however remains greatly distended being filled with fecal material coated with barium Conclusions We have demonstrated a mega rectum of high proportions

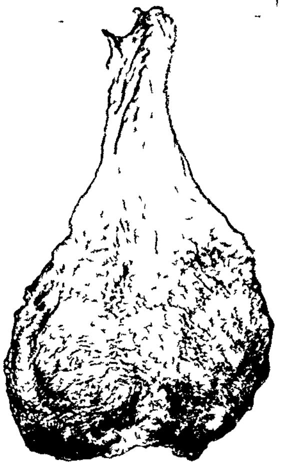


Fig 134 I J, age 4½ Specimen removed by abdominoperineal proctosigmoidectomy without colostomy and with preservation of the sphincter muscle showing enormous distention of the rectum

operative sites showed no evidence of hemorrhage The gross and microscopic description of the surgical specimen is as follows

Gross Description The specimen is a segment of distal large bowel roughly 40 cm long When laid out on the corkboard it is flask shaped The neck of the flask apparently represents sigmoid The greatly dilated portion represents rectum The mucosal surface of the sigmoid portion is thin and smooth That of the remaining portion has a rugous pattern Within the subserosal layer there appear to be several small shotty lymph nodes

Microscopic Description The epithelium is hyperplastic it shows acanthosis and parakeratosis The rectal mucosa reveals a low grade chronic inflammatory response and moderate catarrhal activity In the submucosa





Fig 133 P J age 4½ years Roentgenographic study "The rectum is of tremendous proportions It contains a large amount of fecal material, but no difficulty was encountered in further filling the rectum with the barium water mixture and when so filled it measured about 12 cm in diameter and about 25 cm in length reaching high in the right upper quadrant to a level a few centimeters below the right leaf of the diaphragm The caliber of the bowel lumen rapidly diminishes in the rectosigmoid area in fact there is a rather abrupt transition from the greatly dilated rectum to a sigmoid of normal limits The course of the barium through the colon cannot be completely followed because of the obscuration produced by the huge rectum but all of the filled bowel lies in the left side of the abdomen There is some suggestion of a little barium in small bowel and for this reason we feel that the proximal portion of the colon has been displaced into the left side of the abdomen

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there are several enlarged lymph follicles The muscular coats are perhaps thicker than nor mal and there appears to be an increase in the number of ganglion cells The firm, shotty nodules palpated in the subserosal layer are inflammatory lymph nodes

DIAGNOSIS Megarectum associated with imperforate anus

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cosa above, whereas the cup shaped folds or semilunar valves are covered by modified anal skin. Sections of these cut parallel and at right angles to the anorectal line, show typical stratified squamous epithelium.[3]

The anorectal glands are independent structures, although frequently confused with the crypts of Morgagni. Herrmann[14] referred to them as the deep intramuscular glands and concluded that they were anlages of the muscular layer. Johnson,[16] demonstrated the existence of these ducts and glands and illustrated their structure as well as location. Tucker and Hellwig[3, 33, 34] confirmed this investigation and established the presence of the ducts, both simple and complex, opening into the mouths of the crypts. These investigators concluded that these preformed tubular ducts were accountable for the frequency of anal infection. Hill and his co-workers[10] concur in this view and believe that infection through the gland system is a logical explanation, especially since the ducts extend upward toward the Morgagnian crypts. Pope[4] not only verified these findings but demonstrated that, in the human, a well developed acinar (glandular) structure may exist. That these ducts were preformed and not the result of an inflammatory process was shown by the presence of these same ducts in newborn humans and embryos. It was further noted by the observers that these branching ducts which opened into the mouths of the Morgagnian crypts extended in a radial direction into the submucosa and muscular layer for a distance of from 1 to 5 cm. The lining of these ducts near the mouths of the crypts was of the stratified squamous variety, whereas toward the distal or blind end the ducts presented two or more rows of columnar cells. These cells showed a basal nucleus and a very light protoplasm apparently filled with some secretion which did not take the mucin stain. Excellent descriptions are to be found by Kratzer[35] and Cooper[36, 37] in the literature.

Bacteriology

Investigations show the occurrence of many types of organisms in these crypts, both in pathologic and nonpathologic conditions of the anus and rectum.[4, 13, 1] For this reason these crypts normally offer a fertile field for bacterial growth, so that where traumatism occurs, infection may take place. According to Gant,[7] these small cavities may be the site of gonococci, *Endamoeba hystolytica*, dysenteric bacilli—Shiga's, Flexner's or DuVall's—flagellates, tubercle bacilli, or coccidia. Segments or eggs of helminths have also been found in these crypts.

Etiology

The anatomic arrangement of these crypts is probably the most important predisposing cause of inflammatory and infective processes in the anorectal region. Their delicate structure and the fact that they are cup shaped with their openings directed upward toward the rectum not only prevents drainage but permits them to collect particles of feces and foreign bodies and makes them liable to trauma. When we consider the physiologic activity of the lower bowel and the fact that constipation is of common occurrence and frequently associated with hardened feces, it is not difficult to understand how these crypts and anal valves are the subject of continual irritation. During defecation these pockets may increase in depth and become distended with particles of feces, so that decomposition and pressure necrosis ensue, with subsequent entrance of organisms into the tubular ducts. Frequent loose bowel movements may likewise give rise to irritation in these areas. Foreign bodies lodged in these pockets, such as fecaliths, fish bones, seeds, etc., may also play an important role. Although frequently the cause of such associated conditions of the rectum and anus as inflamed hemorrhoids, proctitis, abscesses and fistulae,

CHAPTER 4

Cryptitis and Papillitis

CRYPTITIS

Definition and Description

Cryptitis is an inflammation of the crypts of Morgagni

Immediately above the anorectal line, the mucous membrane of the rectum is thrown into folds known as the columns of Morgagni Between these adjacent columns, at the level of the anorectal line, are stretched thin folds of anal skin known as the semilunar valves which represent the remains of the absorbed anal plate Behind these valves the mucous membrane dips downward, forming pockets called the crypts of Morgagni[2] or sacculi of Horner[15] The blind apices of these crypts are pointed caudad, while the orifices are open cephalad (Fig 2, p 2) In front, they are bounded by the semilunar valves, behind by the rectal mucous membrane, and laterally, on each side, by the lower edge of the columns of Morgagni Although the function of these crypts has not been definitely established, it is believed that they are intended to retain mucus which is liberated or pressed out at defecation [18, 6] This in turn lubricates the anal canal and serves to protect it from hardened feces

Significance

Many authors stress the importance of cryptic infection in the etiology of various diseased conditions For instance, Martin[17] and Hibshman regarded cryptitis as the most frequent cause of anal fissure Similarly, Hermance[13] feels that the most important factor in the etiology of pruritus ani is cryptitis Buie[6, 61] believes that hemorrhoids are commonly initiated by infection admitted through these Morgagnian crypts, while Synnott[30] states it is a well known fact that the internal opening of fistula in ano is almost always found in an infected crypt Hirschman[1] is of the opinion that infection therein may give rise to various constitutional phenomena such as headache, neuralgia, muscular pain, insomnia and certain skin eruptions Cryptitis may be considered a focus of infection often overlooked

Histology

The mucous membrane of these crypts presents the same simple columnar epithelium as is characteristic of the rectal mu

following which a feeling of discomfort or uneasiness develops At times this becomes most distressing Because of the pain induced by stool the patient is fearful of, and dreads, a movement whereupon through

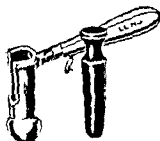


Fig 137 Self retaining electric lighted anoscope

added voluntary inhibition, constipation is produced

Itching not relieved by scratching is not infrequent in cases of cryptitis although there is rarely present a typical pruritus Formication or a sensation of crawling is referred to by Martin and he believed this was due to irritation of the Pacinian corpuscles which seem to be concerned in the transmission of the special sense of pressure The moisture present in these cases may be from the crypts as an inflammatory exudate it may be due to the stimulation of mucus or it may be reflex [3]

Reflex pains are of common occurrence These may be referred to the urogenital area by way of the internal pudic the third and fourth sacral nerves to the perineum by way of the perineal nerves and their branches also the posterior femoral cutaneous nerve to the sacrum and coccyx by way of the iliohypogastric and anococcygeal nerves, or down the limb by the sciatic Gastro intestinal phenomena, such as indigestion, flatulence and constipation may occur [7, 9] Disturbances in the general health of the patient, termed "rectal neurasthenia" may arise due to visceral and spinal nerve irritation This may present itself as mental exhaustion irritability or depression

Diagnosis

Cryptitis is not difficult to diagnose, provided digital and anoscopic examination is made Upon gentle insertion of the lubricated finger the anal canal is frequently found to be tight, owing to the spasmodic contraction of the sphincter As the distal phalanx of the index finger is rotated over the anorectal junction, varying degrees of tenderness may be elicited Usually one or more of the inflamed crypts are detected as the very tip of the examining finger slips into these small depressions In order to visualize the entire anorectal line, a fenestrated anoscope is introduced and, with proper illumination, each crypt is gently drawn downward by means of a bent probe or hook (Figs 138, 139) Ordinarily diseased crypts readily admit the tip of the hook which may be seen immediately beneath the modified anal skin, sometimes extending almost as far as the margin of the



Fig 139 Martin s crypt hook



Fig 138 Rosser s crypt hook

these may all bear influence in the etiology of cryptitis

PATHOLOGY

The most frequent site of these inflamed crypts is posterior, slightly to either side of the midline The inflammatory process burrows beneath the anal lining, and edema, induration and thickening are noted When lacking in many areas and the tunica propria is frequently infiltrated with small round cells, eosinophilic leukocytes and plasma cells In Tucker s cases, however, the crypts usually were found to be intact (Figs 135, 136) In the presence of an acute infection the process was confined to the ducts, as shown by pus cells in their lumen with infiltration of neutrophilic leukocytes

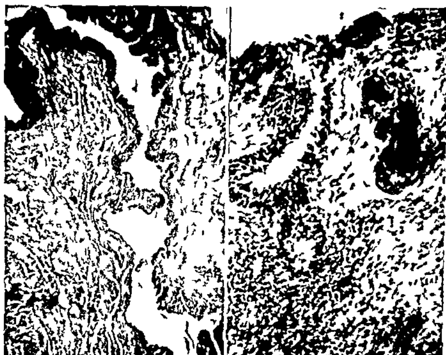


FIG 135 (*Left*) Chronically inflamed anal duct Large epithelial defects in the wall

FIG 136 (*Right*) Primary lesion of pyogenic infection in blind end of branching anal duct Leukocytes have destroyed the epithelium and are collecting in the surrounding fibrous tissue (Tucker and Hellwig)

posteriorly placed, the small spatium or 'space of Brick' situated behind the anal canal is invaded This was termed by Martin 'postanal infection ' (See Anatomy, Chap 1 p 24) In chronic cases the walls were filled with lymphocytes, plasma and wandering cells

HISTOPATHOLOGY

It has been our custom to examine these crypts microscopically following their removal In practically every instance the laboratory has reported the presence of an inflammatory process Usually a few mononuclear leukocytes are present The superficial columnar cells of the crypts are often

SYMPTOMS

Pain is the most common symptom and is usually described as sharp lancinating or burning Less frequently, a heaviness or dull ache is cited When lancinating in character it ordinarily signifies either a tear in one of the semilunar valves or extension of the inflammatory process beneath the anal skin This causes irritation of the spinal innervation with resultant sphincter spasm The *disturbance is aggravated by defecation,*

use of liquid petrolatum given once or twice daily in doses of from two to four drams although this should not be continued over a protracted period

Surgical Technic The inflamed crypt is exposed by means of a self retaining fenestrated anoscope (Fig 137) A few minims of a 1 per cent novocain solution are injected into the base of the crypt and an operative hook is inserted into the crypt which is drawn gently downward and thereby made taut The tip of the hook and the overlying membrane are grasped with a curved hemostat and the crypt in its entirety is removed with a pair of sharp scissors or a scalpel (Fig 140) The overhanging edges are trimmed away and the wound is permitted to heal If several crypts are present conduction analgesia (see Chap 26 p 478) using 1 per cent novocaine or 0 1 per cent nupercaine solution is more satisfactory Although hospitalization is advisable the procedure may be performed readily in the office or clinic Bleeding in these cases is usually negligible so that sutures are seldom necessary

The postoperative care consists of preventing pocketing Gentian violet 1 per cent aqueous solution is topically applied to the wound Sulfathiazole ointment, 5 per cent with 1 per cent pontocaine may be prescribed for nightly application Mineral oil, ½ to 1 ounce, is continued by mouth over a period of time depending on the consistency of the stools Hot sitz baths twice or thrice daily are most helpful In all cases, it is advisable to insert the finger into the anus five to seven days after excision of the crypts, especially if much of the anal skin has been removed



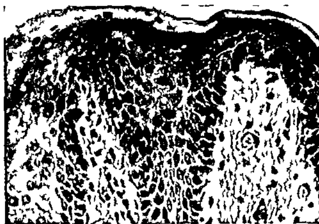


Fig 141 (*Left*) Photomicrograph of papilla Low power

Fig 142 (*Right*) Photomicrograph of papilla High power

PAPILLITIS

Definition and Description

Papillitis is an inflammation of the anal papillae it is frequently followed by hypertrophy and protrusion

Normally anal papillae are triangular projections, from two to six in number, encircling the anus about the anorectal line They arise from the edges of the semilunar valves which guard the crypts of Morgagni or from the bases of the adjacent columns of Morgagni (See Fig 2, p 2)

Etiology

Trauma the result of frequent irritation such as occurs from various types of proctosigmoiditis *hemorrhoidal prolapse* foreign bodies and especially the passage of frequent and hardened stools is the common cause

anus Most frequently these crypts are situated posteriorly to either side of the mid line Normal crypts, however, are rarely caught by the blunt tip of a hook such as is shown in Fig 138

Complications and Sequelae

Papillitis is commonly associated with the importance of these crypts is exaggerated and that very frequently they are removed without definite cause, yet, when the sequelae and complications of this apparently insignificant condition are considered ablation or excision of inflamed crypts must be recommended

Palliative If foreign bodies are present

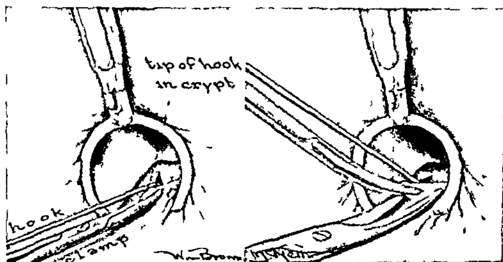


Fig 140 Removal of crypt The tip of the hook is inserted to the depth of the crypt and a curved hemostat is applied to the skin covered hook tip The crypt is then ablated by means of scissors or scalpel

this condition When cryptitis is once established with infection superimposed pus may burrow into the preformed ducts, forming abscesses and fistulae Thus, as Martin stated the frequency with which we locate the internal opening of fistulae and abscesses in one of these crypts leads us to conclude that the infection must have gained entrance at this point especially the ischiorectal and retrorectal varieties ' In many instances by becoming distended with fecal matter the valves are torn forming a true fissure in ano Excoriation and pruritus of the perianal area may occur, due to the leakage of mucus and inflammatory exudate from the crypts Carcinoma of the anus has been reported following chronic cryptitis

Treatment

There is, of course, the possibility that

they should be removed Occasionally cryptitis may respond to local cleansing with some mild antiseptic solution or bland ointment Topical applications of pure ichthyol or silver nitrate, either in stick form or from 5 to 10 per cent solution, may be made daily on the point of a crypt hook Temporarily suppositories containing ichthyol from 2 to 5 grains, or subiodide of bismuth, gr i may be inserted but their value is questionable Instillations into the rectum of from two to three ounces of warm olive oil, or from 10 to 20 cc of 25 per cent aqueous solution of ichthyol, often are found helpful when used once or twice daily Ten cc of either 1 per cent protargol or 0 5 per cent pyridium may be instilled Hydrotherapy in the form of hot fomentations and sitz baths will ofttimes offer relief and comfort to the patient At all times the stools should be kept soft, preferably by the

as instillation, topical application, hot sitz baths compresses and divulsion of the sphincter am the treatment is surgical and consists of complete removal of the papillae

Technic Through a self retaining fenestrated anoscope the base of the papilla is injected with a few minims of 1 per cent procaine solution (Fig 143) and is then removed by means of scissors cautery, snare or papillotome (Figs 144 146) As hemorrhage is negligible in these cases sutures seldom are necessary Postoperative care is similar to that described under cryptitis

PECTENOSIS ANAL FIBROSIS OR MYOSITIS SPHINCTERICA

The author is somewhat reticent to discuss pectenosis and the pecten band inasmuch as the references thereto have left but little imprint that it should be considered a distinct entity The numerous articles available however prompt a recording of the opinions of others since they appear to be of more than academic interest

The pecten so termed by Stroud[8] may be described as a narrow zone extending from the anorectal line above to the intersphincteric line[9] intermuscular septum[10] or White line of Hilton[11] below Occupying the upper third of the anal canal, it embraces the subepithelial areolar tissue namely the preformed (simple and complex) anal ducts and intramuscular glands Miles was the first to affix the term pecten band or "pectenosis" to designate a deposit of fibrous tissue circularly disposed in the submucosa of the pecten That it is purely pathologic in origin and due to passive congestion engendered either by the varicose condition of the hemorrhoidal veins or in some measure by impediment of venous return he is convinced The investigations of Tucker and Hellwig[31] Pope[74] Gorsch[8] and Hill[10] show that the anal ducts, glands, lymphatics muscles and areolar tissue com

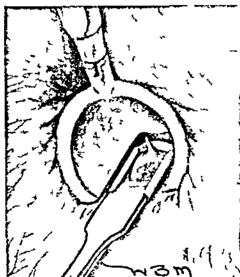


Fig 146 After infiltration of the base of the papilla with procaine solution, a papillotome is placed as shown above and the handles of the clamp are pres ed together

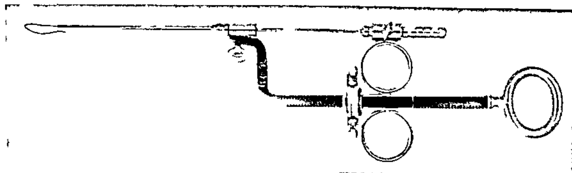


Fig 145 Snare sometimes used for removal of anal papilla

Pathology

The papillae are usually triangular in shape, with the base broad and pinkish in color and the apex white With the passage of each stool these papillae are dragged downward so that sometimes they become acutely inflamed and tender to the touch Continued irritation causes inflammation, hypertrophy and subsequent protrusion sphincteric spasm ensues as the papillae are caught between the sphincter muscle In some cases after a period of time, the muscle relaxes from fatigue and permits the papillae to be seen upon separation of the buttocks Cryptitis is frequently associated with papillitis

Histopathology

Sections show the papillae to be covered externally and on their internal surface by regular stratified squamous epithelium[3] The underlying structure consists of loose collagenous fibers and fibrillar tissue containing a little adipose tissue together with many dilated capillaries filled with erythrocytes Scattered throughout are numerous small round cells, eosinophilic leukocytes and plasma cells (Figs 141, 142)

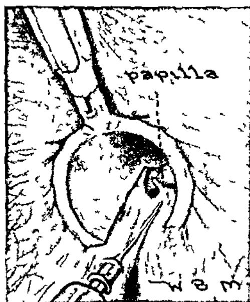


Fig 143 Analgesization of the base of the papilla preparatory to excision

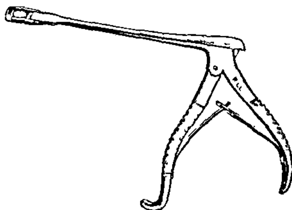


Fig 144 Papillotome

Symptoms

Inflamed papillae seldom cause pain, although a crawling sensation or uneasiness is usually complained of by the patient However when the papillae protrude during defecation, a dull pain may occur although it is a sense of incomplete evacuation that is most frequent Occasionally an exudative discharge may be present which is thick sticky and slight in amount

Diagnosis

Frequently when the sphincter is relaxed the anal papillae may be seen upon separation of the anal margins Digital examination elicits one or more firm, teatlike elevations arising at the anorectal line which are usually sensitive to the touch Through a small proctoscope, these papillae appear reddened in proportion to the degree of inflammation present Although they may protrude below or extend above the anorectal line, they always have their origin at this junction

Differential Diagnosis

Papillitis is to be distinguished from various conditions below and above the anorectal line, as shown in Table 6

Treatment

Except for a few palliative procedures as previously mentioned under cryptitis, such

TABLE 6 DIFFERENTIAL DIAGNOSIS OF PAPILLITIS—(*Continued*)

EPITHELIOMA	ANAL ESTHIOMENE	THROMBOSED INTERNAL HEMORRHOIDS	ADENOMA (RECTAL POLYP)	CARCINOMA
Most common after 40 nodular growth single in or outside anus grows to large size base is more broad and fixed Breaks down to ulcerate Biopsy positive	Most common in Negro females Granulomatous mass about the anus Irregular firm and dusky in color Breaks down and ulcerates Frei test usually positive	Always have their origin above anorectal line covered by mucosa of rectum Globular in shape single or multiple are softer than inflamed papillae	Covered by rectal mucosa are soft and elastic may be sessile or pedunculated In either case the origin is above the anorectal line	Single fungating mass irregular does not glisten and is not smooth The base is broad and fixed breaks down to form craterlike ulcer Proven by biopsy of tissue

prise the pecten tissue Logically therefore, inflammation of the pecten could quite properly be termed pectenitis Many are convinced that pectenosis is commonly associated with various conditions such as cryptitis papillitis fissure fistula hemorrhoids and pruritus Abel[1] for example, remarked that it is uncommon to find a chronic fissure without a pecten band or pectenosis The treatment prescribed by Miles[10] is pectonotomy,' which consists of cutting the pecten band cautiously strand by strand until it is divided completely The after treatment is that which is commonly used Healing generally occurs in three weeks

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TABLE 6 DIFFERENTIAL DIAGNOSIS OF PAPILLITIS

	Inflamed Anal Papillae	External Thrombotic Hemorrhoids	Skin Tags	Condylomata Lata (Luetic)	Condylomata Acuminata
Characteristics	Always arise at anorectal line covered by modified anal skin triangular in shape base broad and pink apex pointed and white Usually multiple bleeding rarely occurs Usually associated with cryptitis	Occur below anorectal line Oval swellings Covered by anal skin, single or multiple livid or blue Firm and painful Rarely bleed unless rupture takes place Usually associated with internal hemorrhoids History of acute onset	Occur about the anal margin covered by anal skin Are soft and flabby of various shapes single or multiple Base is usually broad Painless unless irritated	Present as broad flat papules covered with macerated epithelium frequently assume a luxuriant fungating mass Fissures and ulcerations common At first red then gray Ulceration frequent edges of which rise at right angles to skin Base is indurated and necrotic Other evidence of syphilis Wassermann positive Spirochaete may be demonstrated in serum expressed from base of papules or from scrapings	Usually are present as projections or tufts springing from a single elongated pedicle No induration of base Frequently glistening pale pink in color single or multiple but usually conglomerate

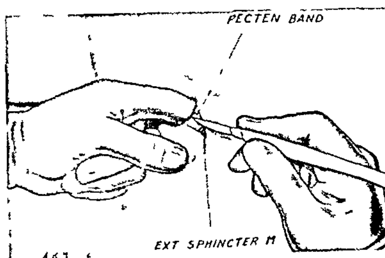


FIG 147 Miles method of dividing pecten band (W E Miles)

CHAPTER 5

Fissure in Ano

DEFINITION AND DESCRIPTION

Fissure in ano is an elongated or slitlike ulcer resembling a tear or crack in the lining of the anal skin at and below the anorectal line, and characterized by a pain interval.

Synonyms are anal fissure, painful, intolerable, irritable, intractable or varicose ulcer.[13, 6, 9]

Fissure generally occurs in the meridian of life, although it is not infrequent in infancy;[19] in the aged it is uncommon due to muscular relaxation.[33] It is more common in women than in men.[5] It is usually single, but when multiple may be and usually is of tuberculous, syphilitic or chancroidal origin. (These may be found described under their respective headings.) A fissure may occupy any portion in the circumference of the anal canal, but its usual site is in the posterior midline (Fig. 148). When laterally placed, it is frequently specific.

ETIOLOGY

Predisposing Causes

The anatomic arrangement of the musculature and fascial extensions in this vicinity predispose to the formation of fissure. The anal lining posteriorly is potentially fixed by virtue of the divisions of the levator muscle (puborectalis, rectococcygei and pubococcygei) and their fascial extensions, together with the conjoined longitudinal muscle. The subcutaneous bundle of the external sphincter offers considerable resistance by its circular arrangement posteriorly. The fibers of the superficial bundle, however, as they arise from the coccyx pass forward to the posterior aspect of the anal lining, where they di-

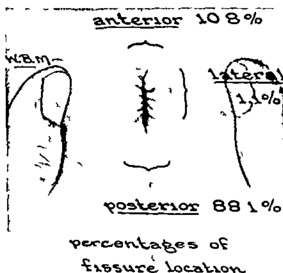


Fig. 148. Fissure. Percentage location.

verge to encircle the anal canal. This divergence was described by Lockhart-Mummery[0] as a 'Y' shaped deficiency. Also the angulation of the posterior rectal wall with the anal canal permits added pressure to be brought to bear at this point. Since the anal canal is lined by modified skin, it is not difficult to understand how thickening occurs with loss of normal resiliency, from the repeated passage of hardened feces. The sphincter muscles are

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matory change present in the corium, is noted by round cell infiltration The entire structure contains a diffuse infiltration of small mononuclear leukocytes and a few polymorphonuclear leukocytes Scattered areas of intercellular interstitial hemorrhages are noted Interspersed is collagenous fibrous connective tissue (Fig 149)

SYMPTOMS

The pain associated with fissure in ano is paroxysmal and is always increased by the act of defecation Generally, it is the most definite symptom although it varies considerably in intensity and duration in different individuals The pain is often referred to as just within the anus and occurs at the time of or immediately following defecation Usually it is described as burning in character, owing to exposure of the nerve endings in and about the ulcer [18, 34] Quite characteristic of fissure in ano is the incidence of a definite pain interval during which time the patient is free from any severe discomfort (Fig 150) This interval which usually lasts from a few minutes to a half hour, begins shortly after the act of defecation and ends with sudden spasmodic contraction of the external sphincter muscle The pain which is due to clonic contraction of this muscle and which in turn is directly proportional to the extent and depth of the fissure may be described as sharp stinging or lancinating in character The extreme distress associated with this disease cannot be minimized, as the wretchedness and physical incapacitation is almost inexpressible This pain may persist from one half hour to several hours, or until the sphincter muscle



Fig 149 Cross section through anal fissure There is a deep crypt the bottom of which is filled with detritus and necrotic tissue The floor of the ulceration consists of chronic granulation tissue

is exhausted, toward the end of which period the patient complains of an aching sensation Eventually the afflicted individual is free of any discomfort until the incidence of the next bowel movement or until the occurrence of such acts as sneezing coughing or urination [11] Bleeding is not uncommon in cases of fissure It is never profuse

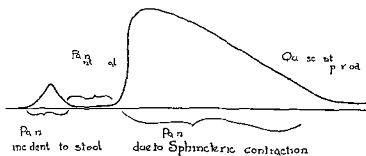


Fig 150 Pain interval chart

normally in a state of tone and yield but slowly, so that any factor tending to weaken the tissues, thereby rendering them liable to abrasion, predisposes to fissure formation. Among these causes may be mentioned congenital narrowing of the anus,[7] constipation, impaction, inflammatory conditions such as cryptitis, papillitis, polypi, proctitis (catarrhal or specific), syphilis, tuberculosis, chancroids and gonorrhea. Hypertrophy and contraction of the sphincter and levator ani muscles are to be included under predisposing causes.

Trauma is the direct cause of fissure in ano. Usually this results from laceration of the anal skin by the direct passage, with accompanying distention, of a hard, dry stool through the anal canal. Since, normally, the sphincters are in a state of tone it is not difficult to understand how this may be brought about. Blaisdell[8] rationalizes as follows: the "Y" shaped gap of the superficial bundle, together with the obstruction to the downward flow of feces rendered by the subcutaneous bundle, actually forms a "bar" type of interference that causes the skin to be broken during the act of defecation. Whitney[35] believes that the anal glands become a prey to infection and as a result of the fibrosis the duct or neck of the glands is strangulated, producing an intersphincteric abscess which may rupture to create a fissure.

Usually, a cryptitis is an associated condition and the semilunar or anal valve which guards the inflamed crypt may be drawn down and torn by passage of the stool to result in a true fissure in ano.[7] In addition to hardened fecal material as a cause, foreign bodies such as fish bones, enema tips, and objects inserted for sexual perversion may be mentioned. Careless digital and instrumental examinations as well as prostatic massage and excessive divulsion of the sphincter may directly cause fissure. Childbirth may give rise to a laceration of the anal lining by over distention of the vagina, and cause a fissure in the anterior commissure.[31] Lynch[21] believes that the congenital absence of the perineum or its rupture during childbirth accounts for fissure in this location.

PATHOLOGY

In the acute stage, a fissure occurs as a superficial breach or tear in the continuity of the anal skin, although it may extend through the subcutaneous tissue into the sphincter muscle. It is linear or elliptical in shape, due to compression of its sides by the sphincter, but when stretched or laid flat, it is circular or oval. The edges are clean, soft, pliable and sharply defined, the base is shallow and elastic. Unless proper treatment is instituted, the fissure fails to heal because of the clonic contraction of the external sphincter muscle. Superimposed is the fact that drainage in this area is poor and thereby the tissues themselves tend toward local infection by daily irritation from feces. The edges of the fissure or ulcer become thickened and occasionally undermined, and the adjacent anal skin is considerably congested. Such cases are extremely sensitive to the touch. At the lower border or limit of the fissure there will frequently be found a tag of edematous skin called by Brodie[10] the "sentinel pile." This is not hemorrhoidal in origin but represents an edema of the skin owing to blockage of the superficial veins[10] and lymphatics by the inflammatory changes present. In the chronic stage the edges of the ulcer appear irregular and somewhat elevated, and the base is hard and inelastic, due to the deposit of fibrous tissue.

The discomfort associated with defecation is due to irritation of the exposed nerve endings in the fissure and its edges, whereas for the most part the severe pain is due to the spasmodic contractions of the sphincters. Long continued and repeated contraction of the external sphincter muscle tends to augment its bulk and strength,[3] but when fatigue occurs it relaxes with temporary cessation of pain.

HISTOPATHOLOGY

Sections show the ulcer limited by stratified squamous epithelium. There is inflam

but is present is a few drops of bright red blood sufficient to streak the surface of the stool or stain the toilet paper Not infrequently it is mixed with the mucus or mucopurulent exudate from the base of the ulcer

Constipation is both a cause of and a sequel to fissure in ano Owing to the incredible dread of defecation, which causes intense and at times inexpressible suffering constipation frequently ensues This may readily give rise to signs and symptoms of auto intoxication

Reflex phenomena may be encountered by virtue of the anatomic relationship between the nerves of the anal area and the urogenital organs For instance, symptoms may be referred by way of the pudic nerve to the uterus and ovaries as dysmenorrhea or amenorrhea to the vagina as vaginismus to the bladder as dysuria polikyuria, or urinary retention to the seminal vesicles as involuntary emissions, or by way of the iliolumbar and sciatic nerves to the back hip and leg Nervous phenomena such as irritability and insomnia may also ensue and the constitution be materially undermined by the ravages of this apparently trivial malady During the examination of recruits Miles [4] found anal fissure a fruitful source of gastro intestinal disturbances

DIAGNOSIS

The history in these cases, betraying the mode of onset the typical pain and the definite pain interval is so characteristic that diagnosis is not difficult On inspection and upon gentle separation of the margins of the anus the sentinel pile of Brodie may be seen, if present, and frequently the lower border of the fissure itself Digital examination in an acute case elicits a tightly contracted anus and usually invokes additional sphincteric spasm The insertion of the well lubricated finger to the side opposite the fissure obviates this to some degree If the pain incident to examination is extremely severe an analgesic ointment may be applied to the tip of the finger In some cases a few minims of a 1 per cent solution of novocaine injected beneath the ulcer may be necessary, and if the ulcer is complicated by abscess formation or extreme irritability, a general anesthetic is required The fissure is sensitive to the touch and appears as a longitudinal slit or crack in the lining of the anal skin The edges are elevated and soft with the base shallow and elastic, while in the chronic type they are indurated with the base deep hard and inelastic (Fig 154) When viewed through a fenestrated speculum, the acute ulcer appears oval in outline the edges are sharply defined and the base is of reddish hue In chronic cases, the edges are undermined and irregular and the base is deep and of a gray color

DIFFERENTIAL DIAGNOSIS

The varied types of anal ulcerations from which fissure in ano must be differentiated may be found in the accompanying Table 7

COMPLICATIONS AND SEQUELAE

Cryptitis and hemorrhoids are frequently associated with fissure Pruritus ani is not uncommon owing to irritation of the perianal area by the mucopurulent discharge Due to the burrowing of the infective process abscess formation and fistula are not infrequent

TREATMENT

Nonsurgical

Constitutional Rest in these cases is voluntarily imperative, since any form of motion may incite sphincteric contraction with excruciating pain The diet should be soft and nonirritating, utilizing those foods which leave but little residue Although constipation should be corrected, drastic cathartics are to be avoided Castor oil ½ to 1 ounce or the fluid extract of cascara ½ to 1 dram are reliable adjuncts when the acute symptoms subside Liquid petrolatum given twice daily in one ounce doses is to be recommended

Palliative Probably the most effective treatment under this heading is the hot sitz bath twice or thrice daily Compresses

Table 7 Differential Diagnosis of Fissure in Ano

	Fissure in Ano	Intra Anal Ulcer	Epithelioma	Tuberculous Anal Ulcer	Chancre (Syphilis)	Chancroid (Soft Chancre)
Symptoms	History of sudden onset Discomfort at stool followed by pain interval and then excruciating pain Bleeding slight	Gradual onset Pain slight at times burning Bleeding moderate	Begins as nodular elevation which breaks down to form ulcer Pain is tormenting when the anal skin is involved	Possibly history of tuberculosis elsewhere Pain is nil unless within grasp of the sphincter muscle Bleeding slight	History of sexual perversion or carelessness Pain is slight if present at all	Usually a history of sexual perversion careless habits or discharge of urethral or vaginal origin
Characteristics	Single longitudinal or slitlike located at and below the anorectal line usually in the posterior commissure Exquisitely tender Sentinel pile of Brodie may be present	Between sphincter muscles not in upper portion of the anal canal Round and irregular in shape	Induration infiltration and fixation	Situated in the lower portion of the anal canal — frequently lateral	Single ulcer usually lateral non sensitive at anal margin or between radial folds	Multiple ulcerations Very tender and painful to the touch Bleeding uncommon
Ulceration	*Acute* – Edges sharply defined and elevated The base is reddish in color shallow and elastic *Chronic*—Edges are irregular and undermined The base is deep gray in color hard and inelastic	Edges ragged or rounded	Edges are pinkish violet in color irregular and raised Base is gray Discharge is watery irritating and slight in amount Inguinal lymphatic enlargement	Ulcer is oval or round Edges are pale pink in color and undermined Base is raw uneven or elevated gray in color and spotted with yellow tubercles Discharge is thick whitish in color and profuse	Circular or elliptical ulcer firm with elevated and indurated borders Base is indolent and gray Purulent exudate is slight and adherent Bilateral inguinal enlargement is usual	Oval or circular in shape granular base with sharply defined edges exudate is profuse and purulent Inguinal lymphatics enlarged unilaterally
Laboratory			Tissue confirms diagnosis	Tubercle bacilli in scrapings from ulcer (See chapter on Tuberculosis)	*Treponema pallidum* in scrapings from ulcer later positive Wassermann	Ducrey s bacillus in scraping from ulcer

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wrung out in hot boric acid solution may be used to advantage Instillations of hot olive oil in doses of from 1 to 2 ounces administered through a small rubber catheter or baby ear syringe have proven efficient in alleviating the discomfort Topical applications of silver nitrate, 10 per cent solution, or in stick form and neutralized by tincture of iodine, or pure phenol neutralized by tincture of benzoin, have occasionally offered good results In the same manner, nitric acid, crystals of copper sulphate, or pure ichthyol may be applied There is but little doubt that suppositories are useless in the treatment of fissure, since upon insertion they immediately pass into the rectum Probably the psychologic effect *attending their introduction does much* toward allaying the discomfort

Injection Quinine and Urea Hydrochloride For injection, quinine and urea hydrochloride has been employed by Graham[1] with gratifying results

Technic The parts are painted with tincture of iodine, 3½ per cent, and by means of a small caliber needle fitted to a tuberculin syringe, 1 cc of freshly prepared quinine and urea hydrochloride 5 per cent *solution, is injected under the fissure One* such treatment may be sufficient although the same may be repeated in the course of a few days

Benacol Prior to the employment of many analgesic solutions, Yeomans Gorsch and Mathesheimer[3] reported the use of a nontoxic anesthetic preparation known as benacol The solution consists of 5 parts each of para amino benzoyl and phen methylol in 90 parts of rectified sweet al *mond oil*

Technic The solution is heated gently before aspiration from the ampule Under sterile precautions, 3 cc of the solution are injected slowly below *the skin, in a fan* shaped manner toward the anus Ordinarily, 3 cc of the solution is sufficient for one quarter of the perianal area, although 6 cc may be used safely Injections are given every two days

A B A Solution Gabriel[14] suggests the use of A B A solution for recent fissures This is composed of anesthesin 3 per cent, benzyl alcohol 5 per cent, and ether 10 per cent in sterilized oil

Technic The perianal area is shaved and painted with tincture of iodine *With a* finger in the anus as a guide, a steel hypodermic needle attached to a syringe is inserted subcutaneously in the midline about 1 inch posterior to the anal verge The needle is extended deeply into the sphincter muscle and half the amount injected on one side and half on the other, saving ½ cc to be injected under the fissure The amount used varies between 5 and 10 cc, proportionate to the physique of the individual *The ampule containing the solution should* be warmed by immersion in hot water before injection is begun Local burning is noted a few hours later, but relief of symptoms is usually experienced within 24 hours[1]

Comment The integrity of these investigators is well above reproach, and it must be admitted that their contributions are worthy of commendation Except in an occasional case where surgery is contra *indicated the injection method, utilizing* one of the above preparations may be employed Our experiences in the clinics of the Graduate and Temple University Hospitals was extremely discouraging, and as early as 1936 the method was discontinued The injection invariably was attended by pain, which is admitted by others, the recurrence rate was high and infection frequent Speare and Mabrey[30] report a series of 129 patients in whom the injection of anesthetic oil was given In 38 per cent recurrence was noted after an average of three months In conclusion they state "The avoidance of a hospital stay, rather *than superior results, justifies* the use of this method as against operation" In the author's opinion the procedure to be recommended is one that effects permanent cure in *nearly 100 per cent of the cases* as is the case with excision

Cauterization The method is performed under an anesthetic and, although it completely destroys the ulcer, the fibrous tissue formation incident to its application prevents proper healing

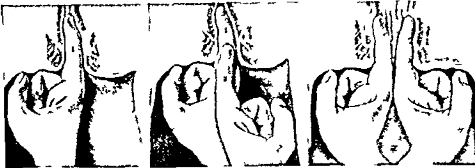


Fig 151 (*Left*) First step of divulsion index finger has been introduced into the lower rectum

Fig 152 (*Center*) Second step Index finger of the opposite hand is now introduced the other being used as a guide

Fig 153 (*Right*) Third step Both index fingers assume a similar position in the anal canal With the wrists crossed the sphincter muscles are stretched by circular movements of the fingers

Technic A suitable speculum is inserted to expose the fissure after which a Paquelin cautery is applied directly thus destroying the ulcer and its base A petroleum jelly gauze strip is then inserted through the anal canal for 24 hours after which it is withdrawn

Divulsion *Method of Recamier* Since the pain incident to the fissure is due to exposure of the terminal nerve endings irritation of which causes spasmodic contraction of the sphincters rest is essential Even though the fissure should be excised in its entirety temporary relaxation may be obtained by stretching the sphincter muscle

Method of Divulsion With the patient anesthetized and in the left lateral or lithotomy position the lubricated gloved index finger of one hand is inserted as far as the anorectal line and with the palmar surface against the anal wall the muscle is stretched by firm pressure applied in a rotary motion (Fig 151) The index finger of the opposite hand is then introduced beside the other and firm pressure made in opposite directions about the circumference of the anus (Figs 152, 153) This procedure, slowly performed, should consume several minutes, as rapidity is conducive to trauma and damage to the musculature The experiments of Quenu and Hartmann showed that proper divulsion caused no extravasation of blood in the muscle or rupture of its fibers

Surgical Treatment

Analgesia Conduction Method [4, 6, 30] The patient is placed in the lithotomy position with the buttocks well over the edge of the table Using a hypodermic needle a wheal is made about one half inch posterior to the anal verge by injecting two minims of a 1 per cent novocaine or a 0 1 per cent nupercaine solution (Fig 154) Then with a finger in the anus as a guide a 2½ inch No 20 gauge needle to which is attached a 10-cc Luer Lok syringe is inserted (see Fig 154) behind the anal canal in the long axis of the bowel In this site 5 cc of the above mentioned solution are injected The needle is then partially withdrawn up to but not through the wheal Now the needle is directed outward slightly forward and deeply toward the levator ani muscle to its full length and at this point 5 cc of the solution are injected The opposite side is then similarly treated In from

3 to 5 minutes the posterior quadrant will be completely analgized If the fissure is located at any other site in the circumference of the anal canal, the technic described in Chapter 26, page 479, is suggested

Operation INCISION *Method of Boyer (Sphincterotomy)* The purpose of this procedure is to place the fissure at rest thereby permitting it to heal This is accomplished by making a single incision through the ulcer including a portion of the underlying sphincter muscle

Technic A longitudinal incision is made from a point just above the upper border of the fissure to just below its distal edge passing through the center of the ulcer base The incision in the upper portion should be shallow, dividing only the subcutaneous fibers of the external sphincter muscle but as the scalpel is withdrawn, approximately one third of the fibers of this muscle are severed (Fig 155) Subcutaneous sphincterotomy, which consists of cutting the sphincter through a small puncture wound behind the anus, has been recommended [3]

Comment Because this procedure does not remove the ulcer either in part or in its entirety, it is our feeling that "incision" should be reserved only for those few cases where excision may be refused or contraindicated

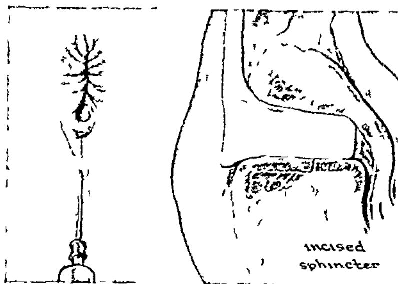


FIG 154 (*Left*) Analgesia preparatory to excision of fissure Through an intradermal wheal made beyond the outer margin of the fissure, a larger caliber needle is inserted through this wheal and in the midline and parallel to the anal canal the needle is withdrawn out to but not through the wheal and directed outward and deeply to one side The needle is withdrawn again out to but not through the wheal and advanced in a similar manner on the opposite side In each site the procaine solution is injected

FIG 155 (*Right*) Sagittal section showing the extent of the incision through the depth of the ulcer to include the superficial fibers of the external sphincter muscles

EXCISION This embodies the removal of the ulcer in its entirety

Technic Under analgesia, the lower border of the fissure is seized with small hemostats applied on each side If a crypt is present immediately above the fissure a Rosser hook is inserted and drawn gently downward Then, with scalpel or scissors the ulcer is completely excised (Fig 156) In like manner, the uniterminal desiccating current may be used with gratifying results

Should a sentinel pile be present, this, too, is included in the excision This is followed by a posterior sphincterotomy, passing entirely through the subcutaneous bundle of the external sphincter muscle Such treatment affords adequate drainage of the space of Brick,[9] the 'triangle of Minor,'[3] or the superior sphincteric space' of Courtney[1] Bleeding points are ligated and *sterile gauze is applied and held in place* by a T binder

Comment This method seems to offer all that can be desired and may be recommended for routine use

Excision Followed by Suture This procedure consists of excision of the ulcer followed by suturing the upper or mucosal edge of the wound with catgut (Fig 157)

Technic The fissure is grasped about its upper or proximal margin with hemostats and excised in its entirety in the fashion described above The edge of the mucosa is then tacked to the subcutaneous tissue using 00 plain catgut

Comment This method is to be recom

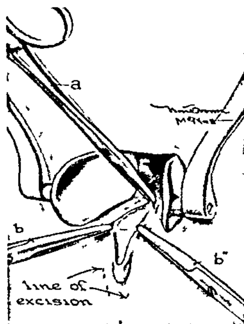


Fig 156 Method of excision The inner apex of the fissure is caught with hemostats, as are its lateral margins An incision is made around the margins of the ulcer and carried posteriorly, as shown, to avoid pocketing

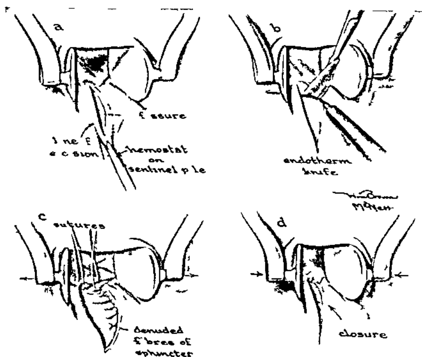


Fig 157 (a) Lines demonstrate proposed site of incision (b) Excision of entire fissure from apex to anorectal line (c) Introduction of catgut sutures (d) Skin approximation as retracting speculum is removed

mended because it materially lessens the period of convalescence

Postoperative Treatment If the operation is performed in the office or clinic, adhesive straps across the buttocks may be substituted for the usual T binder Where the patient is permitted to go home he is advised to apply a hot water bottle continuously to the outside of the dressing For restlessness a tablet of sodium amytal grains iii, or nembutal grains 1½ may be prescribed to be repeated if necessary The following day the patient returns, at which time the adhesive straps and petroleum jelly gauze are removed Mercurochrome 5 per cent, or gentian violet, 1 per cent, is applied to the wound and hot sitz baths thrice daily are ordered Liquid petrolatum in 1 or 2 tablespoonful doses is continued throughout This procedure is used until the wound heals entirely, although the lubricated finger is inserted on the fifth sixth or seventh day

All our patients are hospitalized Here the following routine is used During the first 24 hours the patient is confined to bed with compresses wrung out in hot boric acid solution continuously applied to the perineum For pain during this period, morphine sulphate gr 1 6 hypodermically is given every eight hours, if necessary If local analgesia has been employed, sodium amytal grains iii, or nembutal grains 1½ is given by mouth every eight hours if indicated Throughout the period of hospitalization, the patient receives liquid petrolatum ½ to 1 ounce night and morning by mouth Mercurochrome 5 per cent, or gentian violet 1 per cent is applied to the wound on a glass rod Twenty four hours following operation, the patient is permitted out of bed and hot sitz baths are begun On the morning of the second day, a small warm olive oil enema is administered through a 14 F soft rubber catheter Milk of magnesia is given by mouth thereafter The patient is discharged on the succeeding day It is well to remember that the care following operation is as important as the procedure itself Frequent supervision and the periodic insertion of the lubricated gloved finger will prevent bridging and effect healing from the base

SUMMARY For permanency of cure, excision of the fissure is the procedure of choice The method outlined on page 145 (Fig 157) with or without suture of the retracted mucosa is advocated

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CHAPTER 6

Anorectal Abscesses

DEFINITION

Abscess of the anorectal region is not unlike that occurring elsewhere in the body and may be defined as a circumscribed or localized collection of pus in a cavity formed by tissue disintegration In this locality abscesses are very numerous and their importance should not be underestimated since neglect, delayed or improper intervention only too frequently results in extensive tissue destruction, multiple fistulae permanent incontinence and general debility

Our discussion of anorectal abscess and fistula is based on a series of 1 400 cases from the Graduate Hospital clinic, some 600 cases from the Temple University Hospital clinic and 200 odd cases from a tuberculosis sanitarium, as well as over 900 cases from our private records

INCIDENCE

Abscess in this vicinity is encountered at all ages but is more frequent during the active periods of life from 20 to 45 Although the condition is more prevalent in the male sex many have been observed in females and particularly of the colored race largely no doubt because of the disease lymphogranuloma venereum

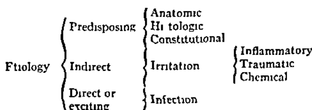
Anorectal Abscess and Fistula in Infancy

Age	Number
2 to 3 months	3
4 to 6 months	4
7 to 12 months	9
13 to 29 months	23
	39

ETIOLOGY

For the purpose of clarity, the various causes of abscess are grouped under the headings as shown in the accompanying chart

Anatomic Because of the abundant



areolar tissue and the numerous blood vessels and lymphatics, this region is peculiarly susceptible to inflammatory and suppurative processes The small pockets normally situated at the anorectal line and known as the crypts of Morgagni are subject to traumatism by virtue of their arrangement

Histologic The presence of well-developed simple tubular or more complex branching ducts opening into these crypts may be considered a predisposing factor

Constitutional Under this heading may be included such conditions as malnutrition anemia, cardiorenal and hepatic diseases syphilis, diabetes, tuberculosis malignancy dysentery, typhoid fever and regional enteritis[29] which bring about changes in the body chemistry to disturb the intricate system of resistance to infection

Irritation Inflammatory processes within the bowel as cryptitis lymphangitis, papillitis, fissure, hemorrhoids various types of proctosigmoiditis stricture and malignancy and those from without, as dermatologic conditions of the anus and perianal skin pre and postsacrococcygeal sinuses, cysts and tumors necrosis of the sacrum coccyx or pelvic bones prostatitis vesiculitis pelvic diseases etc may provoke suppuration, especially if secondarily infected

Traumatism Injuries as perforations and puncture wounds, kicks blows riding or falls upon the buttock may predispose to infection with suppuration Impaction constipation foreign bodies sodomy and careless instrumentation are to be mentioned also

Chemical The use of various chemicals in the treatment of pruritus ani hemorrhoids and prolapse such as alcohol distilled water caustics and acids has been followed by suppuration Under physical causes may be mentioned uncleanliness and excessive perspiration Radium and x ray burns and the use of the cautery diathermy and enemas of boiling solutions or olive oil should be included respectively under photic and thermic causes

Infection Although irritation in some form or other always plays an important role, the entrance of pyogenic bacteria is the exciting cause The portal of entry may occur by direct spread, as through a crypt from the bowel itself leading to the anal ducts and glands, or from some adjacent tissue or organ from or through the anal and perianal skin, by the lymphatics or by the blood stream

Much emphasis has been placed, during the past decade, on the presence of preformed structures, such as the anal glands and the anal ducts in relation to the pathogenesis of anorectal disease Tucker and Hellwig[13, 14] are convinced that infection productive of fistula (abscess is to be included) incubates in the anal ducts, having been conveyed by infected fecal material through the crypts of Morgagni Gordon Watson and Dodd,[1] however believe the anal glands to be vestigial remnants which by obliteration of the anal ducts loose their connection thereto They explain the presence of infection from the anal canal on the basis of patency of the ducts Hill and his co workers[6] further investigated the structure distribution and relationship of the anal glands in a series of fetuses newborn infants and adults and observed a wide variation as to number depth and contour *Lack of complete canalization of the terminal portion of the canal glands* was observed in newborn infants Deep penetration of the anal glands extending along muscle bundles fascial planes and adjacent structures points to possible avenues of invasion Evidence of a cyst of the tubular portion of the anal gland suggests a secretory function

BACTERIOLOGY

The offending organisms usually present in any abscess are the staphylococcus streptococcus and *B coli* At times the *B pyocyaneus B proteus actinomyces* and *Myco tuberculosis* are found in abscesses in this region As determined by bacteriologic and histopathologic examination tubercu

lous abscess and fistula occur in from only two to five per cent of all cases.[21]

PATHOLOGY

Following some form of irritation as just enumerated, pyogenic organisms are permitted to enter and invade the immediate or adjacent tissues As a result of the inflammatory process the cells are liquefied by the proteolytic enzymes and a cavity is formed containing pus Either absorption of the dissolved material occurs and the solid debris is removed by leukocytes and endotheliocytes, in which case granulation tissue fills the defect and the area is cicatrized, or, if the infection persists and is active, the abscess increases in size so that pressure symptoms result In the ensuing effort of the abscess to evacuate its contents the purulent material tends to follow the line of least resistance, and this path is termed a sinus If rupture occurs on a skin, mucous or serous surface, it is known as a fistula Microscopy shows a circular area in the center of which are bacteria, surrounded by necrotic material, outside of which is a wall of leukocytes—for the most part the polymorphonuclear variety—lymphocytes plasma and endothelial cells New capillaries and fibroblasts representing reparative change are usually in evidence In the tuberculous variety the purulent material is thin and dirty white in color and often contains cheesy particles The *Myco tuberculosis* may be demonstrated by the methods described under Tuberculosis, Chapter 14 In a true cold abscess no pyogenic organisms are demonstrable[11]

SYMPTOMS

In general abscesses of the anorectal region present symptoms similar to those in other parts of the body, namely—heat redness, swelling tenderness and fluctuation, as well as varied constitutional phenomena The temperature is usually elevated and the pulse rapid A leukocytosis of from 16 000 to 25 000 is common and in many cases may reach 36 000 or even 42 000 Sedimentation tests show either a diagonal or vertical curve, by the Wintrobe, Westergren or Cutler method According to the site involved, the symptoms vary, and will be discussed under their respective headings

Chronic or Cold Abscesses

These are usually of insidious onset and devoid of the classical picture of inflammation Such are due to necrosis or tuberculosis Even when the process is fully developed there is little pain and tenderness over the infected area, and because there is absence of redness or inflammatory reaction, the term "cold abscess" is applied Usually the only symptom will be the distortion of the part from the accumulation of purulent material, and even this distortion may be absent if the localization is above the levator ani muscle Ordinarily the condition is secondary to a tuberculosis in some other part of the body, usually the lungs, although it may occur during the course of a tuberculous ulceration of the rectum In the latter case, there will be the history of the antecedent infection with its diarrhea and discharge, making one suspect the presence of a cold abscess as soon as it begins to develop Even without this history, an accumulation of fluid beneath the skin of the buttocks and near the anal margin, without any acute symptoms, would cause a suspicion of tuberculous abscess, particularly in a person with pulmonary tuberculosis

TREATMENT

In general the treatment of all anorectal abscesses except possibly the cutaneous variety, consists of immediate incision and drainage There are three rules in opening an abscess that should be followed always, and this holds true for the subcutaneous ischiorectal pelvirectal and retrorectal varieties the incision should be anteroposterior or parallel to the anal slit it should be made beyond the outermost fibers of the external sphincter muscle yet as near to

the maximum point of fluctuation as possible, it should be of sufficient length to afford good drainage The last will depend on the individual case

Sulfonamide therapy, both the absorbable drugs (sulfathiazole preferably) and the nonabsorbable (sulfathalidine preferably) has been employed to advantage as supportive treatment in extensive infections At no time should these drugs serve as a substitute for the more reliable procedure—adequate drainage Sulfathiazole is given in an initial dose of two and one half grams followed by one gram every four hours until a blood sulfathiazole level of from eight to ten is attained An equal amount of sodium bicarbonate or lactate is administered The nonabsorbable sulfonamides may be utilized for the coliform bacteria such as succinylsulfathiazole (sulfasuxidine) 0 25 Gm per body kilogram weight every four hours with an initial maintenance dose of 0 5 Gm , or, phthalylsulfathiazole (sulfathalidine), 0 1 Gm per body kilogram weight every four hours with an initial maintenance dose of 0 2 Gm Penicillin administered intramuscularly in a dosage of 30 000 units every three hours with an initial dose of 100 000 units has been employed in fulminating cases In a few instances we have used streptomycin (from two to three grams every 24 hours), having isolated the *B proteus* in patients with intractable and recurrent intramural and retrorectal abscesses It is well to recapitulate that, while these agents have assisted in the management of a selected group of patients, their utilization should be an adjunct and not a substitute for adequate drainage Where a tuberculous process is known or suspected to be present the anesthesia should be spinal sacrocaudal or

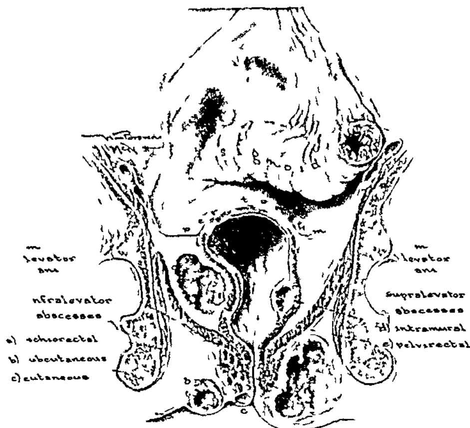


Fig 158 Abscesses of the anorectal region supralevator and infralevator

local, and the incision of the abscess and excision of the skin edges performed with the radio knife As in other cases, an attempt should be made to find the original point of entry Hospitalization in the tuberculous should not be prolonged, because these cases seem to progress poorly Heliotherapy using the quartz mercury vapor lamp does much toward decreasing the period of convalescence[14, 49] Also to be mentioned are a nutritious dietary fresh air, sunshine, graded rest and supportive tonics

CLASSIFICATION

For the purpose of clarity, abscesses of the anorectal regions are divided into those *above and those below the levator muscles*, as shown in the accompanying table

Anorectal Abscesses	Infralevator (*superficial*)	Cutaneous Subcutaneous Isch orectal
	Supralevator (deep)	Mural Pelvirectal Retrorectal

INFRALEVATOR ABSCESSES

Cutaneous or Tegumentary Abscess

Occurring in the perianal skin, this variety appears as one or more small eleva*tions containing a drop or two of purulent* material

Etiology Infection through a hair follicle or through a sebaceous or sweat gland is the usual cause and is brought about by some form of irritation as from clothing excessive perspiration, uncleanliness and discharges of anorectal, vaginal or urethral origin

Symptoms Other than to mention the presence of a small tender swelling approximately the size of a match head, beside the anus, the patient offers no complaint The condition is not affected by movement of the bowels, although sitting and walking at times aggravate it sufficiently to cause him to seek medical advice

Diagnosis Most characteristic is the fact that the process is confined to the skin Redness, swelling, tenderness and pustulation are present (Fig 158 c)

Treatment Scraping off the surface of *the pustule and inserting the tip of* a wooden applicator, previously immersed in phenol 95 per cent, will usually prove effective Ordinarily, it is unwise to incise following analgesiation, since this procedure may carry the infection to the deeper structures Where multiple lesions occur about the anogluteal region, an autogenous vaccine may be employed to advantage More recently, we have used sulfonamide ointment with satisfactory results

Subcutaneous, Subtegumentary or Marginal Abscess

As the name implies, this is an abscess in the subcutaneous tissue about the anus It usually occurs at the anal margin and appears as an oval swelling inflammatory in character and of moderate size This variety of abscess is usually lateral to the anal aperture, although the sites immediately behind and in front of the anus are not uncommon locations Such are referred to respectively as postanal and perineal abscesses

Etiology Subcutaneous abscesses may *occur as an extension of the tegumentary* type just described, but, in the vast majority of cases the entrance of pyogenic organisms through some abrasion in the anal lining or at the anorectal line, such as cryptitis and fissure in ano, is the cause Perineal abscesses may have their origin in a crypt but frequently they arise from an infection in the male urethra

Symptoms *The presence of a tender* swelling about the anus is usually cited by the patient Ordinarily the pain is of a throbbing character and is increased in intensity by defecation and by motion as walking Whereas an anterior perianal or perineal abscess frequently causes urinary and prostatic symptoms, a posterior perianal or postanal abscess is attended often by pain *over the sacrococcygeal region*

Diagnosis The occurrence of a small

swelling presenting the classical signs of inflammation and occurring about the anal margin and beneath the skin will offer little difficulty as to diagnosis (Fig 158 b) Whereas the cutaneous variety is slightly mobile and can be picked up between the thumb and index finger, this subcutaneous type is more deeply situated and quite stationary

Sequelae This variety of abscess may extend peripherally in the subcutaneous tissue invade the ischiorectal fossa, break through some abrasions in the anal lining or at the anorectal line, or rupture through the skin

Treatment Initially the surface of the abscess is painted with some antiseptic as picric acid, iodine or cresoidin Although intradural, epidural or general anesthesia is the method of choice analgesia may be accomplished by (a) freezing the skin overlying the abscess with ethyl chloride in the line of the proposed incision (b) infiltrating the superficial skin with procaine solution or (c) depositing the procaine in a V shaped manner through an intradermal wheal deeply on each side of the abscess

Technic An anteroposterior incision is made and a blunt probe gently introduced in an effort to ascertain the location of the internal or primary opening This should be done cautiously so as not to make a tract where one does not exist Finally the skin edges are trimmed to afford good drainage and a small piece of rubberdam or a wick of gauze impregnated with dichloramine T is inserted The after care consists of cleanliness, sitz baths and topical application of brilliant green or gentian violet one per cent solution

Ischiorectal (Ischio anal) Abscess

This is the most frequent variety of abscess in and about the anorectal area and as the term implies occurs in the *ischiorectal fossa* (Fig 158 a) This fossa is bounded laterally by the obturator fascia obturator internus muscle and ischial tuberosity, medially by the internal and external sphincter muscles, above by the levator ani muscle, posteriorly by the gluteus maximus muscle and sacrotuberous ligament, and anteriorly by the transverse perinei superficialis muscle and perineal fascia

Etiology Infection gaining entrance through a crypt of Morgagni is the most frequent cause although the process may result from an ulcerative lesion in the anal lining as for example, a fissure, from an ulcerative process in the rectum by direct extension of a retrorectal superior pelvirectal or subcutaneous abscess or from the urogenital organs Instances of abscess and fistula caused by oxyuris vermicularis and its ova have been cited (Fitzwilliams[1] Marshall[34] Weighmann,[47] Chiari,[8] Vuillemire[46]

Symptoms The initial symptom is an uneasiness or discomfort in the tissues beside the anus and is frequently ushered in by constitutional reactions as chills and fever The local discomfort increases in intensity takes on the character of a dull ache and finally becomes throbbing Usually the pain is exquisite and aggravated by movements of the bowel in addition the patient is unable to walk sit or lie down in comfort The presence of a swollen area beside the anus that is excruciatingly tender and of large size is cited Difficult or painful urination is not uncommon, due to pressure and irritability of the nerves to the neck of the bladder Other symptoms as fever headache irritability and malaise are mentioned

Diagnosis If the boundaries of the ischiorectal fossae are kept in mind little difficulty will be encountered in making a diagnosis of abscess in this site The history of a dull throbbing pain perhaps ushered in by chills and fever and of short duration the presence of a swelling beside the anus which is hot, red tender and fluctuating induration and usually fluctuation as determined by the palpating finger inserted into the anal canal at times elevated tem

TABLE 8 DIFFERENTIAL DIAGNOSIS

	ISCHIORECTAL	SUBCUTANEOUS	SUBMUCOUS	RETRORECTAL	PELVIRECTAL	SACROCOCCYGEAL OR PILONIDAL SINUS WITH ABSCESS FORMATION	ACUTE PROSTATITIS PROSTATIC ABSCESS ACUTE SEMINAL VESICULITIS
Site involved	Ischiorectal fossa	Subcutaneous tissue of anal and perianal area If perineal—it is in front of *anterior* anal verge If post*anal* —it is behind posterior anal verge	Wall of rectum	Retrorectal fossa	Pelvirectal fossa	Sacrococcygeal region	Prostate and seminal vesicles
Characteristics	*Swelling redness* tenderness and fluctuation noted by inspection and palpation of perianal area Usually of large size	*Same* Usually of small or moderate size Urinary symptoms frequent in *perineal* variety	*No external manifestation* Noted by palpating finger in rectum a soft rounded or ovoid fluctuating mass circumscribed in the wall	*No external manifestation* Determined by *palpating finger* against posterior wall of rectum Fluctuating mass behind but not in the wall Firm pressure in the area between the coccyx and the anus causing pain is of *great diagnostic importance*	*No external manifestation* Fluctuant mass felt laterally anteriorly and outside the rectal wall Urinary symptoms not uncommon	Besides swelling redness tenderness and *fluctuation* there will be noted one two or more openings in the midline over the sacrum and *slightly* to either side Hair may pro*trude* Usually the abscess is confined to the area above the coccyx but it may invade the tissues below	Prostate is smooth elastic hot and painful vesicles are boggy and sensitive

perature and rapid pulse will clinch the diagnosis

Differential Diagnosis Ischiorectal abscess may be confused with the subcutaneous retrorectal, and superior pelvirectal varieties, as well as acute prostatitis prostatic abscess acute seminal vesiculitis and pilonidal abscesses, for which reason the distinguishing features of each are shown in the accompanying table (See Table 8)

Sequelae A suppurative process in the ischiorectal fossa may break through the perianal skin leaving a fistula, single or multiple it may extend to the opposite ischiorectal fossa (usually by passing behind the anal canal rather than in front) forming a bilateral ischiorectal or horseshoe abscess or the purulent material may burrow through the levator posteriorly forming a retrorectal or anterolaterally forming a pelvirectal abscess

Treatment In order to prevent extension of the purulent material which is so devastating to adjacent tissues and structures immediate incision and drainage is recommended in every case where the abscess is well formed Residents in hospitals should be instructed as to the proper method of incision so that these cases can be drained upon entering the receiving ward

Nonsurgical If for some reason operation cannot be performed immediately confinement to bed and the continuous application of compresses wrung out in hot boric acid solution will afford some degree of relief In such it may be permissible to institute the therapy outlined on page 151 as a preliminary measure The danger here however, is of rupture which occurs in the weakest site and which may not be desirable For instance the abscess may break through to involve some of the fibers of the sphincter muscle or it may rupture far from the anus in which case the period of healing is prolonged Soft evacuation may be obtained by the use of mineral oil given two or three times daily in liberal quantities



Fig 159 Illustration of ischiorectal abscess showing site of anteroposterior incision Dotted lines represent sites of excision to prevent premature closure

Surgical Method of Incising an Abscess Whether an abscess is incised in the office receiving ward or the operating room certain rules must be followed (1) the incision should be made anteroposteriorly (2) it should be as near the maximum point of fluctuation but as close to the anus as possible (3) it must be made outside the outermost fibers of the external sphincter and (4) it should be of sufficient length to afford good drainage at least ¾ inch or more depending on the size of the abscess In each case, the outer skin edge should be excised to prevent closure (Fig 159) In all cases where simple incision and drainage is to be or has been done, the patient should be told the purpose of the procedure and especially that a secondary operation will be necessary Ordinarily the author has been able to incise the abscess and proceed with the definitive surgical treatment of the fistula as a one stage procedure This form of treatment is not to be recommended for the novice As Fansler[15] indicates when the abscess is large preliminary drainage permits the cavity to evacuate its contents and shrink Thus there results less deformity of

the anus at the time the fistula is treated by a secondary operation

Anesthesia General, spinal and sacro caudal anesthesia are the ideal methods to be employed The infiltration of pro caine superficially in the skin along the proposed incision, while not to be recom mended may be employed provided the abscess is not too deeply situated

Technic With the patient preferably in the exaggerated lithotomy or inverted posi tion and under anesthesia, a single straight or slightly curved anteroposterior incision, from one to three inches in length, is made over the maximum point of fluctuation, but as close to the anal aperture as possible, provided, of course, it is beyond the outer most fibers of the external sphincter muscle Ordinarily these fibers extend laterally from the anal slit one inch If, at first, no puru lent material is encountered, the incision is deepened The pus having exuded, the finger is now introduced into the wound to deter mine the extent of involvement and whether anterior, lateral, posterior or around the anal canal Invasion of the pelvirectal space can be ascertained by perforation of the levator ani muscle with the finger or hemo stat, although a good rule to follow is that if the levator is resistant to the tip of the instrument the supralevator space on that side is uninvolved The extent of the ab scess having been determined, the skin edges overlying the abscess cavity are ex cised with scissors, scalpel or radio knife, although that portion of the skin immedi ately over the sphincter muscle is left in tact In this way good drainage is afforded If the adjacent tissue is undermined and necrotic tissue is present this should be removed in its entirety Such a maneuver carried out in this fashion favors good drainage, does not impair the sphincter mechanism and permits the wound to gran ulate in from the bottom

If the abscess is localized and not too extensive, an attempt should be made to find the internal opening by gently passing a curved probe, using one finger in the anal canal as a guide The tract will frequently be found with the internal or primary open ing located posteriorly to either side of the midline in one of the crypts of Mor gagni

Bleeding points are controlled by hemo stats temporarily applied or coagulation Dry gauze is supported by means of a T binder

Postoperative Care During the first 24 hours, compresses wrung out in hot boric acid solution are applied continuously A hot water bottle applied to the perineum will assist in keeping the compresses warm The wound is cleansed daily and painted with mercurochrome, from 5 to 10 per cent, or gentian violet, 1 per cent solution Whether or not irrigation of the wound with warm normal saline or potassium permanganate 1 10,000 solution is bene ficial is a matter of conjecture In our clinic it was used over a period of time in a substantial series of cases yet we failed to observe any advantageous effects and the procedure was discontinued The patient is permitted hot sitz baths, twice or thrice daily on the day following operation These are comforting to the patient and do much toward keeping the parts clean On the morning of the second day, a small enema of warm olive oil is administered and milk of magnesia, one ounce, is given by mouth in the afternoon Soft evacuations are made possible by the use of liquid petro latum given in half ounce doses twice daily by mouth

SUPRALEVATOR ABSCESSES

Submucous, Interstitial or Mural Abscess

This variety occurs in the submucosa of the rectal wall It is usually located in the lower portion of the rectum in which case it can be palpated easily by the examining finger (Fig 158 d)

Etiology The cause is infection which gains entrance probably through one of the crypts of Morgagni, leading to the anal

ducts and glands, although inflammatory processes of the rectum, as stricture and malignancy, lymphangitis and phlebitis, extension from pararectal abscesses, and traumatic influences as enumerated under general etiology, play an important role

Symptoms A throbbing sensation or dull ache and a feeling of weight in the rectum are frequently cited by the patient The discomfort especially at first is increased only slightly by movement of the bowels and then only when irritability of the levators occurs with subsequent contraction of the sphincter muscles It is in no way comparable to the pain as encountered in the acute type of ischiorectal abscess Constitutional disturbances of varying degree may occur, such as fever headache and malaise

Diagnosis In all cases the history is obscure therefore the diagnosis of submucous abscess rests upon digital and proctoscopic examination Ordinarily an ovoid fluctuating mass in the wall of the rectum and bulging into the lumen is felt In addition it is tender and boggy Through the proctoscope the smooth and regular contour may be noted Incision into or aspiration of the abscess will confirm the diagnosis

Complications and Sequelae A submucous abscess may rupture and discharge its purulent contents into the lumen of the rectum or extend into the pelvirectal, retrorectal or ischiorectal fossae



Fig 160 Method of incising submucous abscess

Treatment Anesthesia Incision and drainage of a submucous abscess may be performed without anesthesia, inasmuch as the incision through the rectal mucosa is painless If however the abscess is low lying and immediately above the anorectal line, some pain may attend the procedure since a few of the filaments of the somatic portion of the nervous system (cerebrospinal) extend ¼ inch or more upward It is better, therefore, to employ some form of analgesia which will relax the sphincter muscle and facilitate insertion of the proctoscope

The exact location and extent of the abscess having been confirmed again by digital examination a proctoscope offering a fairly large distal lumen is introduced and the mass visualized Incision into the maximum point of fluctuation and introduction

of the tips of closed hemostats, which are then opened to enlarge the wound, may be done, but such an opening soon becomes occluded and the inflammatory process persists. A much better way and one which is usually followed by a permanent cure is to make a longitudinal incision the entire length of the abscess from above downwards with a scalpel, scissors, cautery or endotherm knife (Fig 160.) The latter two cause less bleeding although, in this variety of abscess bleeding is usually not troublesome. At no time should a transverse or crisscross incision be made. The abscess having been evacuated of its contents, a drain of rubberdam or a gauze strip may be inserted into the cavity. The sphincter muscle should be divulsed. Finally, a rubber tube is introduced into the rectum above the operative area and dressings are applied.

Postoperative Care The rubberdam or gauze drain is removed at the end of 48 hours. Gentle irrigation of the rectum and abscess cavity is of questionable value, although if such is desired potassium permanganate 1 10 000 solution 110° F, may be used. The direct application of gentian violet 1 per cent solution may be made through a proctoscope or on the finger, although we prefer the direct application of 5 per cent sulfathiazole ointment. Penicillin with urethrane has been used recently. Mineral oil is administered by mouth twice daily in sufficient quantities to cause a well lubricated stool.

Pelvirectal Abscess

This variety of abscess as the term signifies, occurs in one of the pelvirectal spaces, which has been described (see p 20) as being bounded above by the peritoneum, below by the levator ani muscle, behind by the lateral ligaments and rectum and in front by the bladder, prostate and seminal vesicles in the male and the uterus and broad ligaments in the female (Fig 158 e.) The condition is not uncommon and unfortunately often progresses unobserved or undiagnosed except by the well trained

Etiology Ulcerative processes of the rectum, such as are seen in the various proctididies and stricture, traumatism from *foreign bodies, extension of a submucous* abscess, or an ischiorectal abscess, or some infection in the broad ligaments, prostate, seminal vesicles or urethra most frequently cause suppuration in this locality.

Symptoms Ordinarily the symptoms are vague and ushered in by constitutional reactions, as chills, fever and malaise. The initial symptoms referable to the rectum are a heaviness and a bearing down sensation. Desire for bowel movement is not uncommon. Some discomfort on defecation occurs late but it seldom approaches the severity of that encountered in the infralevator abscesses, especially the ischiorectal variety. It is usually dull, more or less constant, yet accentuated somewhat by action of the bowels. Referred pain to the urogenital organs is quite common while to the lumbosacral region it is relatively infrequent. Unlike the symptoms in suppurative processes below the levators, tenderness on moderate pressure over the perianal region is not complained of by the patient. The lower abdomen however, may be extremely tender and at times rigid, indicative of peritoneal irritation.

Pelvic abscess following acute appendicitis or salpingitis is frequently encountered, yet a primary suppurative process occurring infra or subperitoneally and offering signs and symptoms of peritoneal irritation is relatively rare. Seventeen patients in whom a diagnosis of appendicitis or diverticulitis were made five of whom have been reported previously by the writer,[1 3 4] have come under our care. Two illustrative cases are reported herewith.

Case 1 E E a white female, aged 24 was admitted to the Graduate Hospital because of abdominal pain. Examination disclosed the right lower abdominal quadrant to be extremely tender and moderately rigid. The temperature was 103° F, pulse 112, and respiration 20. Blood count leukocytes, 24 000, polymorphonuclear leukocytes 90 per cent. A diagnosis of acute appendicitis

was made and the patient prepared for operation The surgical resident at this time, having been impressed with the value of routine rectal examination, introduced his finger and noted a soft mass in the right lateral rectal wall which differed from the left Consultation disclosed a fluctuant mass in the right pelvirectal space Prompt incision of the area by the ischial approach elicited a large amount of purulent material Within a few hours the appendiceal symptoms had subsided and the fever dropped to 99° The patient was per

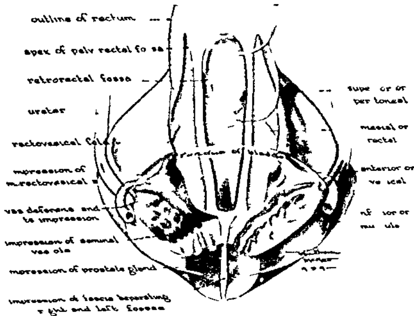


Fig 161 Represents the pelvirectal spaces as two paired masses whose various facies correspond to the pelvic bones viscera muscles and peritoneum

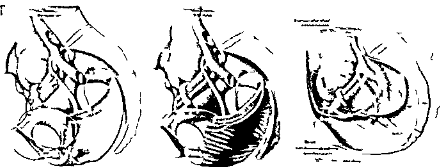


Fig 162 (*Left*) The right mass" in situ viewed from the left It is related to the bladder prostate and seminal vesicles anteriorly the rectum medially and the pelvic diaphragm inferoposteriorly (*Center*) Represents the left ' mass in situ viewed from the left as it is related to the bladder prostate and seminal vesicles anteriorly the pelvic diaphragm posterolaterally and the peritoneum superiorly (*Right*) Represents the pelvi after the removal of the right mass ' the rectum bladder prostate and vesicles the peritoneal edge has been left to define the normal limits of the pelvirectal space Arrows indicate progress of pelvirectal abscess upward and forward toward right inguinal fossa (H E Bacon and T F Reuther Pelvirectal abscess simulating acute appendicitis Tr Am Proct Soc 1939, pp 193 194)

of the tips of closed hemostats, which are then opened to enlarge the wound, may be done, but such an opening soon becomes occluded and the inflammatory process persists A much better way and one which is usually followed by a permanent cure is to make a longitudinal incision the entire length of the abscess from above downwards with a scalpel, scissors, cautery or endotherm knife (Fig 160) The latter two cause less bleeding, although, in this variety of abscess, bleeding is usually not troublesome At no time should a transverse or crisscross incision be made The abscess having been evacuated of its contents a drain of rubberdam or a gauze strip may be inserted into the cavity The sphincter muscle should be divulsed Finally, a rubber tube is introduced into the rectum above the operative area and dressings are applied

Postoperative Care The rubberdam or *gauze drain is removed at the end of 48* hours Gentle irrigation of the rectum and abscess cavity is of questionable value, although if such is desired potassium permanganate 1 10 000 solution, 110° F, may be used The direct application of gentian violet, 1 per cent solution may be made *through a proctoscope or on the finger*, although we prefer the direct application of 5 per cent sulfathiazole ointment Penicillin with urethrane has been used recently Mineral oil is administered by mouth twice daily in sufficient quantities to cause a well lubricated stool

Pelvirectal Abscess

This variety of abscess as the term signifies, occurs in one of the pelvirectal spaces, which has been described (see p 20) as being bounded above by the peritoneum, below by the levator ani muscle *behind by the lateral ligaments and rectum* and in front by the bladder prostate and seminal vesicles in the male and the uterus and broad ligaments in the female (Fig 158 e) The condition is not uncommon and unfortunately often progresses unobserved or undiagnosed except by the well trained

Etiology Ulcerative processes of the rectum, such as are seen in the various proctididies and stricture, traumatism from foreign bodies, extension of a submucous abscess, or an ischiorectal abscess, or some infection in the broad ligaments, prostate, seminal vesicles or urethra most frequently cause suppuration in this locality

Symptoms Ordinarily the symptoms are vague and ushered in by constitutional reactions, as chills, fever and malaise The initial symptoms referable to the rectum are a heaviness and a bearing down sensation Desire for bowel movement is not uncommon Some discomfort on defecation occurs late but it seldom approaches the severity of that encountered in the infra levator abscesses, especially the ischiorectal variety It is usually dull, more or less constant, yet accentuated somewhat by action of the bowels Referred pain to the uro*genital organs is quite common* while to the lumbosacral region it is relatively infrequent Unlike the symptoms in suppurative processes below the levators, tenderness on moderate pressure over the perianal region is not complained of by the patient The lower abdomen, however, may be extremely *tender and at times rigid, indicative* of peritoneal irritation

*Pelvic abscess following acute appendi*citis or salpingitis is frequently encountered, yet a primary suppurative process occurring infra or subperitoneally and offering signs and symptoms of peritoneal *irritation* is relatively rare Seventeen patients in whom a diagnosis of appendicitis or diverticulitis were made, five of whom have been reported previously by the writer [1, 3, 4] have come under our care Two illustrative cases are reported herewith

Case 1 E E, a white female, aged 24 *was admitted to the Graduate* Hospital because of abdominal pain Examination disclosed the right lower abdominal quadrant to be extremely tender and moderately rigid The temperature was 103° F pulse 112, and respiration 20 Blood count leukocytes 24,000 polymorphonuclear leukocytes 90 per cent A diagnosis of acute appendicitis

should be made always outside rather than into the rectal wall

TECHNIC An anteroposterior incision from one to one and a half inches in length to prevent subsequent closure It is usually advisable to enlarge the initial skin incision or else remove a portion of its outer edge to permit drainage Final inspection with

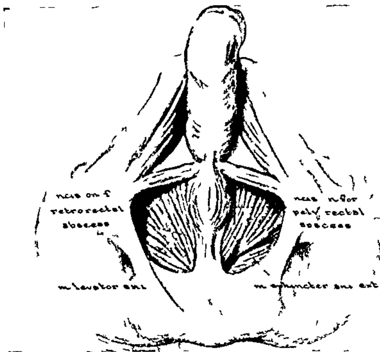


FIG 163 Incision for pelvirectal and retrorectal abscesses

is made to the posterolateral aspect of the anal aperture It should be so constructed that the sphincter muscle is not included in the incision A reliable guide is to measure off with the eye approximately 1 inch from the anal slit representing the outer most fibers of the external sphincter muscle, and make the incision beyond this point (Fig 163) With the finger in the rectum as a guide a closed hemostat is introduced through the incision and advanced gently parallel to the finger Pushing the closed hemostat ahead and opening it as is done in blunt dissection is ideal since unnecessary bleeding is avoided As the inferior surface of the levator ani is approached, which may be noted by a sense of resistance to the tip of the hemostat the instrument is thrust through ' for a distance of about ¼ inch When the purulent material escapes the opening in the levator is enlarged the tip of the finger will determine the extent of the abscess A large drain of iodoform gauze surrounded by rubberdam is lightly introduced to the depth of the cavity and held in place by dressings

Postoperative Care While the patient is confined to bed, which ordinarily is one day, compresses wrung out in hot boric acid solution are applied continuously The wound is packed but not irrigated Hot sitz baths, sufficient only to cover the buttocks are ordered two three or four times daily beginning the second postoperative day Subsequent care consists of cleanliness of the parts and prevention of skin closure In short the wound must heal from within outward

RETRORECTAL ABSCESS

A localized collection of pus in the retrorectal space (Fig 164) which is situated in

mitted out of bed on her third day and hot sitz baths begun She was discharged from the hospital two days later The wound healed satisfactorily in an uneventful fashion

Case 2 C L, a white male, aged 56, was admitted to the hospital because of abdominal pain and discomfort, as well as a sensation of weight in the pelvis The onset of the pain occurred two days previously and was associated with chills and fever The pain itself was cramplike and associated with attacks of nausea no vomiting was cited Movements of the bowel had been regular When examined, the thighs were flexed on the abdomen and the patient appeared to be in agony

On palpation of the abdomen, the tenderness was most marked in the lower left quadrant, and there was more than a suggestion of muscle rigidity The temperature was 102 2° pulse 118, respiration 22, blood count leukocytes 21,000, polymorphonuclear leukocytes, 88 per cent A provisional diagnosis of peridiverticulitis was made

The patient, who was of the intellectual type, was quite emphatic that the abdominal pain occurred simultaneously with an indeterminate weight and discomfort in the pelvis and offered the suggestion that "his bladder or rectum be examined Consultation by a member of our department elicited a large fluctuant mass in the left pelvirectal space Under lumbar analgesia an ischial incision was made and the purulent material promptly evacuated The wound was enlarged and two cigarette drains introduced The temperature returned to normal and he was discharged from the hospital seven days later The wound healed uneventfully It may be mentioned that four months later the administration of an opaque enema followed by air inflation disclosed a normal bowel

The peritoneum itself has no sensory innervation Nerves lie in the connective tissue immediately below the peritoneum (Hellier [5]) The anterior abdominal wall is supplied by sensory branches of the same nerves that supply the muscles namely a portion of the fifth and all the lower six thoracic (Cokkins[9]) The connective tissue below the pelvic peritoneum, however, receives its innervation from the fourth and fifth lumbar and sacral nerves This area of the peritoneum as well as the inferior portion of the posterior abdominal wall is less sensitive than that of the remainder Cope[1] has clinically divided the peritoneum into demonstrative and nondemonstrative areas the pelvic peritoneum being classed as non demonstrative It is for this reason that infections involving this area do not immediately nor frequently produce lower abdominal pain, tenderness and muscle rigidity

The connective tissue beneath the pelvic parietal peritoneum is loose and areolar Infections occurring therein may spread by way of the lymphatics or by direct extension into the loose tissue spaces The mode of spread has been shown graphically by Hellier, who injected plaster of paris into the area through the broad ligaments and compared it with the findings in cases of pelvic cellulitis of puerperal origin He was able to show that spread from the pelvis occurs anteriorly and upward toward the inguinal ligament to involve finally the abdominal wall in this area Pelvirectal abscesses occur in the same region, and as they increase in size, may extend upward in the same manner Involvement of the retroperitoneal connective tissue of the lower abdominal wall will produce pain, tenderness and muscle rigidity It is in this stage of the process that symptoms are produced which may be interpreted as, or confused with, acute appendicitis and diverticulitis

Diagnosis Digital examination elicits an induration and a boggy, fluctuating mass above the levator through the anterolateral wall of the rectum If the subject is a female, rectovaginal examination is of utmost value The temperature is usually elevated and the pulse rapid A high leukocyte count is common

Complications and Sequelae Neglected superior pelvirectal abscesses may rupture into the rectum bladder, urethra vagina, peritoneal cavity or ischiorectal fossa

Treatment As in all abscesses the treatment is surgical and consists of adequate incision and drainage In the pelvirectal and retrorectal varieties however, the incision

abscess is likewise surgical As in the procedure for the superior pelvirectal variety, the rectum itself is at no time incised

TECHNIC An anteroposterior incision from approximately 1 to 1½ inches in length is made in the skin lateral to and slightly behind the posterior anal verge (Fig 163) It should be outside the outer most fibers of the sphincter muscle as described under the treatment of pelvirectal abscess With the finger in the rectum as a guide a closed hemostat is introduced through the skin incision and advanced in the manner previously described but it is directed toward the retrorectal space—that is posteriorly and medially With the escape of pus, the opening is enlarged by withdrawing the hemostats open The extent of the abscess whether to the postanal or ischiorectal fossa is determined by the finger tip Finally the lateral skin edges are excised to prevent closure Dressings are then applied and held in place by a T binder

The postoperative care is similar to that described under superior pelvirectal abscess

SUMMARY Adequate incision and drainage is advocated in all cases of abscess In the pelvirectal and retrorectal varieties the incision should be made outside the ano rectum but not through the rectal wall as described under Technic page 161 Ordinarily, the wound is not packed nor irrigated Occasionally in a deep seated case the loose introduction of a small wick of one inch gauze packing saturated with cod liver oil proves advantageous for a few days

PERIRECTAL CELLULITIS

Ordinarily perirectal cellulitis is a fulminating infection of the adipose tissue within the closed space defined by the endopelvic fascia It readily spreads to the retroperitoneal tissues Such an extension results in an overwhelming infection that may rapidly progress to a fatal termination

Etiology The usual cause is a neglected or poorly drained perirectal or perianal abscess In a period of 18 months, the author observed nine virulent cases complicating stricture of the rectum In all except one, the histologic tissue reports were suggestive of lymphopathia venerea and all Frei reactions were positive Eight were colored ranging between the ages of 29 and 47 and seven were females Previously, two cases of diffuse cellulitis (one gangrenous) were observed following the sacrocaudal injection of alcohol for the relief of pain in advanced malignancy Others have reported a similar occurrence following injections for hemorrhoids prolapse and pruritus ani Perforating wounds of the rectum in the First World War commonly resulted in perirectal cellulitis When this complication was avoided in the recent war by more adequate surgery, the mortality was reduced from 45 to 10 per cent

Symptoms Some recent infection injury or form of treatment is usually obtained from the history A sensation of heaviness in or around the rectum rapidly becoming an exquisite constant pain with swelling of the parts tenesmus and discharge of foul smelling bloody purulent material are cited Urinary symptoms in the male are not uncommon Constitutional reactions as high fever malaise irritability and exhaustion are present

Diagnosis An apparent active spreading infection of acute or comparatively recent onset, with marked swelling tissue destruction septic temperature high leukocyte count in an extremely prostrated individual will indicate the diagnosis

Treatment The treatment is free incision and drainage preferably under low intradural analgesia One or more incisions are made avoiding the sphincter muscles and other important structures This is accomplished by making anteroposterior or parasacrococcygeal incisions, as described under the treatment for pelvirectal abscess Thorough debridement of the devitalized tissue is important All packing should be lightly inserted and cover dressings kept saturated preferably with warm potassium

front of the sacrum behind the rectum, below the peritoneum and above the levator ani muscle, is termed a retrorectal abscess It is separated from the superior pelvi abscess are frequently ushered in by chills and fever Usually the patient complains of a sense of weight in the rectum or a dull, aching pain over the sacrum and coccyx

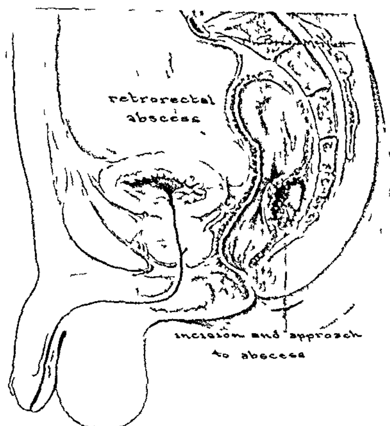


Fig 164 Retrorectal abscess

rectal space by the lateral ligaments of the rectum

Etiology Any suppurative process in or around the rectum may become localized in the retrorectal space Infection through an anal crypt is an important factor Rupture of a submucous abscess usually posteriorly or posterolaterally situated extension of an ulcerative process in the rectum, such as seen in stricture and various types of proctocolitis and from a postanal or ischiorectal abscess perforations of the rectum from trauma due to foreign bodies and instrumentation presacral cysts and tumors and necrosis of the pelvic bones, sacrum and coccyx may give rise to an abscess in this region

Symptoms The symptoms of retrorectal Pain radiating down the limbs is not uncommon Although not an early symptom discomfort at the time of bowel movement is frequently cited by the patient Constitutional disturbances as headache and malaise, are usually mentioned

Diagnosis Extreme pain, elicited upon firm pressure over the skin between the tip of the coccyx and the anus, is an important diagnostic sign This, and the ability to palpate through the rectum an indurated fluctuating mass posteriorly and outside the wall, will leave little doubt as to the diagnosis

Sequelae A retrorectal abscess may rupture into the peritoneal cavity ischiorectal fossa postanal space or rectum

Treatment The treatment of retrorectal

abscess is likewise surgical As in the procedure for the superior pelvirectal variety, the rectum itself is at no time incised

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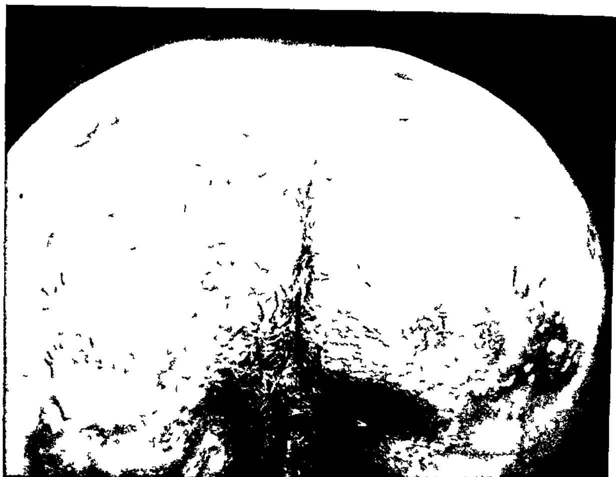


FIG 165 Hidradenitis suppurative (C L Martin)

permanganate or some other antiseptic solution In some cases the construction of a temporary double barrel colostomy under local analgesia may be a timely procedure

GANGRENOUS PERIPROCTITIS

Gas gangrene of the anorectum incorrectly termed gangrenous cellulitis, is fortunately very uncommon few cases having been reported[7, 16, 18, 19, 0, 7, 30, 3, 33, 36, 39, 40, 50] One case was observed by the author following the sacrocaudal injection of alcohol for the relief of pain due to extension of a carcinomatous process According to Meleney[35] infectious gangrene may be either a gas gangrene or a hemolytic streptococcic gangrene In the former the devitalized muscle and connective tissue surrounding the rectum which result from action of pyogenic organisms are then decomposed by anaerobic bacteria of which the *Bacillus aerogenes capsulatus* of Welch and Nuttal[48] now termed *Clostridium welchii*,[6] is the most important species of bacteria, although Jablon[16] has listed some sixty strains as causing gas gangrene

Pathology Gas gangrene of the perirectal tissues may develop following a suppurative process either subsequent to or independent of some operative procedure or injury Ordinarily there is marked distortion and swelling of the perianal region and in the cases reported, extension to the scrotum or vulva buttocks and sacrococcygeal region are not uncommon The spread of the infection may be confined to the perianal and subcutaneous tissues but, for the most part the adjacent musculature is involved The skin appears red and brawny and covered with small discrete vesicles which later break down to leave bluish black patches Even though ingenious bacteriologic methods for the rapid identification of gas forming organisms are

available, prompt surgical therapy must not await a bacteriologic diagnosis. This virulent and rapidly progressing infection demands immediate surgical treatment.

The recent catastrophies of World War II markedly stimulated the study of gas gangrene. As a result, we are more than ever impressed by the fact that adequate prompt surgery is the most effective measure both in the prevention and treatment of gas gangrene.

Sera, chemotherapy and antibiotics can not be regarded as substitutes for surgery but they are valuable auxiliary measures both prophylactically and therapeutically. Sulfadiazine and sulfathiazole are not effective against all strains of gas forming organisms. Experimentally penicillin has proved a powerful therapeutic agent. Since penicillin is a mixture of at least four strains, bacteriologic specificity is of less importance than with sulfonamides. A study of seven American brands of gas gangrene antitoxin indicated that they were principally of value in preventing or delaying anaerobic infections until adequate surgery could be performed.[23, 24] They had some value therapeutically as an adjunct to surgery. Dowdy, Sewell and Vincent[13] found antitoxin particularly of value late in experimental gas gangrene because of its toxin neutralizing effect. It must be used in large



Fig 166 Hidradenitis suppurativa multiple perianal sinuses (C L Martin)

amounts and given in a relatively short period of time. Precautions must be taken against anaphylactic reactions; where the test for sensitivity is positive, careful desensitization must be carried out. In the British army[10] the average therapeutic dose of antitoxin in severe cases was 1 950 000 units. In addition to proper surgery, a combination of penicillin and antitoxin appears to be most generally approved at present as a prophylactic and therapeutic agent.

PERIANAL PYODERMA

Under the terms acne conglobata[3] and hidradenitis suppurativa (Verneuil[59, 9]), a chronic inflammatory disease capable of involving the perianal skin and subcu

taneous tissue has been described The disease, though rare, is considered clinically a distinct entity Its recognition is of import since it may be confused with anorectal abscess and fistula, as well as pilonidal cyst It should be mentioned that a restudy of tissue sections removed from our patients diagnosed as anal esthiomene shows a remarkable resemblance to the histologic picture of this condition

Kolliker[31] nearly a century ago postulated that odoriferous or apocrine glands contained more protein and fat than do the ordinary eccrine glands The apocrine sweat glands are found only in the cutaneous surfaces where hair exists or has existed They apparently do not function until sexual glandular maturity According to Richter,[38] they lead in secreting cholesterol, occur twice as frequently in women, become numerically decreased in old age and enlarged during pregnancy Verneuil[40] was probably the first to associate the occurrence of abscesses with the apocrine sweat glands

The etiology of perianal pyoderma is generally considered to be unknown although Sutton and Marks[4] are of the opinion that these designated terms namely acne conglobata perianal pyoderma and hidradenitis suppurativa represent various manifestations of one disease They believe that fundamentally it is a disease of lipid metabolism Of their ten cases reported each showed hypoglandular defects

Perianal pyoderma usually produces slight symptoms in proportion to the extent of the disease process It frequently begins after puberty and consists of a cycle of abscess formation draining sinuses and extensive scarring Often the chief complaint is discharge of purulent material requiring the patient to wear protective dressing

In perianal pyoderma there is thickening, elevation and induration of the skin from the sacrum to the perineum Many sinuses varying in size from a pinpoint to 0 5 cm are present in the involved skin The larger sinus openings have rounded elevated edges often bearing tufts of granulation tissue Pressure on the diseased area causes the discharge of pus from the innumerable sinuses Undrained abscesses beneath the skin are tender and fluctuant The color of the skin varies from bluish pink to brownish red Probing the sinuses demonstrates that the subcutaneous adipose tissue is honeycombed with abscess cavities

As to treatment, prompt and satisfactory response was obtained by Sutton and Marks[4] with a low fat diet and by the administration of adequate thyroid, as judged by the basal temperature They suggest the following low fat diet without nutritional curtailment

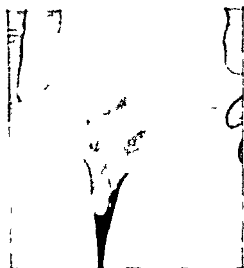
Cereals (hot or cold) wheat, bread
Fruits (apple, pear, banana and others)
Vegetables (potato, rice tapioca, corn hominy beans of all kinds, peas, cauliflower cabbage, turnip, lettuce, onion, celery, cucumber, pickle)
Sugar (jam jelly, honey, syrup, sugar, candy [stick candy], gumdrops, jelly beans caramel, taffy)
Lean Meats (beef veal chicken all sea food all game fishes frogs legs gelatin white of eggs visceral organs such as liver kidney, sweetbread)
Salt pepper, spices
Beverage except milk chocolate alcohol, tomato juice, grape juice

AVOID

Milk and cream
Butter
Ice cream
Cheese (except cottage cheese)
Pork ham bacon, sausage, frankfurter, gravy fried foods nuts peanut butter
Vegetable oils (Crisco corn oil, olive oil, margarine)

Surgical excision of segmented strips will continue to be the procedure of choice until proper evaluation can be made of the disease from a metabolic standpoint in a substantial group of cases Both Smith[41] and Jackman[9] recommend incision and drainage of the individual abscesses and roentgen therapy in the early cases and surgical excision with a plastic repair in those advanced In our experience attempt at skin grafting has not been too promising although our series comprises only five cases

PI ATE 2



W B nge 6 Hydradenitis suppuri tiva—corrected by surgical excision

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CHAPTER 7

Fistula

ANORECTAL FISTULAE
RECTOVAGINAL FISTULAE
RECTO-URETHRAL FISTULAE
TUBERCULOUS FISTULAE
COLONIC FISTULAE
COLOVESICAL FISTULAE

ANORECTAL FISTULAE

Definition and Description

An anorectal fistula may be defined as a pathologic tract or abnormal communication between the anorectum and some adjacent tissue, viscus or skin surface.

Invariably, all fistulae are preceded by abscess formation which in turn, usually originates from an infection entering through a crypt of Morgagni situated at the anorectal line. The site of origin of a fistula is termed the internal opening and the terminal end the external opening. Buie[9] has suggested use of the term 'primary' for the internal and 'secondary' for the external opening. The site of origin most frequently occurs in the posterior commissure slightly to either side of the midline. Fistulae may extend in any direction to involve a neighboring viscus, tissue or external skin surface (Fig. 167.) These tracts may be single or multiple, yet usually have but one internal (primary) opening, although many external (secondary) openings may be present on the skin surface. Fistulae may be simple, complex or complicated.

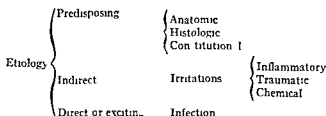
Incidence

Fistulae are of common occurrence and represent a large percentage of the diseases originating in and about the anus and rectum.[4] Although they may occur at any period of life from infancy to old age, fistulae are most frequent between the ages of 20 and 60.[84] As to sex, various authors[4, 89] agree that they are more common in men than in women. At the Graduate Hospital clinic, our statistics showed a relatively high frequency in the colored race, especially in female subjects.

Etiology

The factors responsible for fistulae are similar to those for abscesses. Quite properly, abscess formation should be considered an intermediary stage between the cause and the resultant fistula.

For the purpose of clarity the causative factors of fistulae are grouped under the headings as shown.



47 Weigmann F Oxyuren im periproktitischen Absze s Berl Klin Wchnschr 58 732 1921
48 Welch W H and Nuttall G H F A gas producing bacillus capable of rapid development in the blood vessels after death Bull Johns Hopkins Hosp 3 81 1892
49 Werner, J Actinotherapy in anorectal infections particularly its use in patients with pulmonary tuberculosis Tr Am Proct Soc 32 28, 1931
50 Wyman H C Perirectal gangrene Lancet 16 244 189?
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Yaker[10] report the occurrence of this sequence following injections of phenol in oil in the treatment of hemorrhoids Radium or x ray burns and the use of the cautery, diathermy and *enemas of boiling water* or olive oil may be included respectively under photic and thermic causes

Infection This is the exciting cause of any abscess and fistula Normally, the rectum is laden with micro organisms, so that following abrasion pathogenic organisms are permitted to enter The liberated toxins may pass through by a process of osmosis [7] involve the glandular structures described by Tucker and Pope or merely follow the perivascular spaces to form an abscess[90] With the discharge of pus a suppurating channel is produced known as a fistula The most common offending organisms encountered are the staphylococcus strepto coccus and the colon bacillus Infrequently the *B pneumoniae Neisseria gonorrheae*[6] *actinomyces*[19] *B dysenteriae B typhosus* and *Myco tuberculosis* may be isolated

Classification

Simple Complex and Complicated Fistulas Fistulae may be classified as simple, complex or complicated

A *simple* fistula refers to one in which an internal (primary) and an external (secondary) opening is present with an intervening *tract between This is the variety* most frequently met in the anorectal region Pathologically it is always complete, although clinically we may be unable to demonstrate its internal (primary) opening It consists of an internal (primary) opening at the anorectal line, usually located posteriorly and one or more external (secondary) openings in the perianal skin with an intervening or communicating tract between (Fig 169) For the purpose of description, the internal variety of fistula may be included under the heading of simple although invasion of other structures may alter their classification A *complex fistula* is one in which one or more internal (primary) openings may be present with tortuous and branching tracts usually deeply situated and having corresponding apertures in the perianal, gluteal perineal or scrotal skin or inguinal region A complex type known as a horseshoe fistula may be included under this heading This represents a semicircular tract extending around the anorectum from one ischiorectal fossa to the other, with one or more external (sec

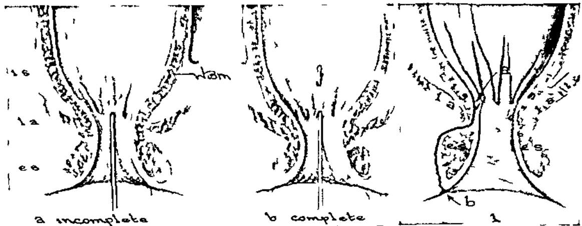


Fig 168 (*Left*) Illustration showing internal fistula

Fig 169 (*Right*) Complete anorectal fistula showing tract extending between external and internal sphincter muscles (a) represents the internal opening and (b) the external opening (e.s) external sphincter (i s) internal sphincter (l.a) levator ani

Anatomic Due to the abundant areolar tissue, numerous blood vessels and lymphatics, the anorectal region is peculiarly susceptible to inflammatory and suppurative processes The crypts of Morgagni,



Fig 167 Complete anorectal fistula in a child five weeks old probe demonstrating external and internal openings

which normally are small indentations or pockets situated at the anorectal line are subject to traumatism It is not essential however that their free border or semilunar valve be torn or lacerated for infection to gain entrance since by injury to the lining of the crypt rather than the inner surface of the semilunar valve, infection may invade apparently normal glandular structures

Histologic The observations of Tucker and Hellwig[103] have shown the existence of well developed glandular structures emptying into the mouths of the crypts of Morgagni These tubular ducts which they consider to be secretory in function, and which extend into the submucosa in a branching fashion, are lined for a variable length by epithelium, giving evidence that they are not internal fistulae That portion emptying into the mouth of the crypt of Morgagni is lined by stratified squamous cells, while at a more distal portion the cells change to a simple columnar variety Besides confirming the above findings, Pope[164] demonstrated that a truly acinar structure is usually present These authors consider that the course of a fistulous tract is dependent on the course, location and extent of these branching tubular glands

Constitutional Under this heading may be included those conditions which lower the general vitality of the individual Diseases such as tuberculosis, syphilis dysentery[19] and typhoid fever may predispose to fistulae That fistulae are not uncommonly associated with regional enteritis has been cited [94, 158]

Irritations Inflammatory Cryptitis is probably the most frequent factor in the etiology of this malady Fissure, proctitis, prolapsing internal hemorrhoids, prolapsus, procidentia recti and polypi may be mentioned as additional causes of irritation The ulceration and discharge associated with stricture, together with the infiltration and disintegration attending carcinoma, especially when located in the lower portion of the rectum, are common causes of fistulae Infrequently, sacral dermoid and necrosis of the coccyx or pelvic bones[16] may give rise to this condition Quenu and Hartman,[169] as a matter of fact, believed that lymphangitis of rectal origin was an important factor in abscess and fistula formation

Traumatic Injuries, as perforating and puncture wounds, kicks, blows, riding[21] or falls upon the buttock may result in suppuration with subsequent fistula Constipation, careless instrumentation, sodomy, foreign bodies, as fish or chicken bones, and objects inserted for sexual perversion may produce abscess with resultant fistula Silbernagel[183] cites the inadvertent conversion during childbirth of a silent internal sinus into a complete rectal fistula during the performance of a perineotomy

Chemical The injection and local application of caustics and acids have been occasionally followed by abscess and fistulae Rosser [177] Gant, Campbell [31] Morgan[14] and

Yaker[10] report the occurrence of this sequence following injections of phenol in oil in the treatment of hemorrhoids Radium or x ray burns and the use of the cautery, diathermy and enemas of boiling water or olive oil may be included respectively under photic and thermic causes

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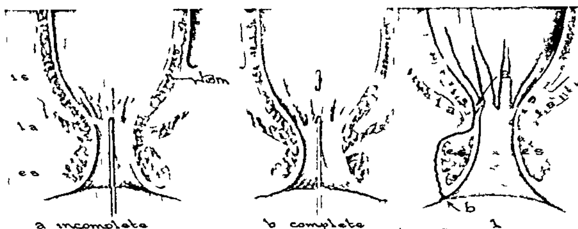


Fig 168 (*Left*) Illustration showing internal fistula

Fig 169 (*Right*) Complete anorectal fistula showing tract extending between external and internal sphincter muscles (a) represents the internal opening and (b) the external opening (e.s) external sphincter (i.s) internal sphincter (l.a) levator ani

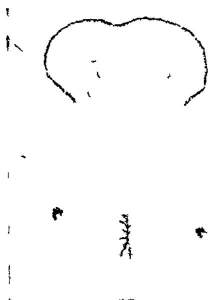
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ondary) openings on either side in the perineal or anogluteal skin, but with one internal (primary) opening at the anorectal line (Fig 170)

A *complicated fistula* denotes a tract communicating with some diseased bone such as the sacrum, coccyx, pelvis or an adjacent organ, in which case the fistula bears the name of the structure involved, e g, bladder, rectovesical, urethra recto urethra uterus, recto uterine, vagina, rectovaginal, vulva, rectovulvar (Figures 197 198, 200 provide very good examples)



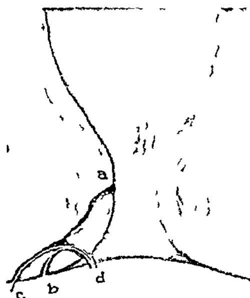


Fig 170 (*Left*) Anterior horseshoe fistula showing an opening on each side of the anus Internal opening not shown

Fig 171 (*Right*) Anorectal fistula with multiple external openings

Because the tissues immediately behind the anal canal are more loosely arranged than in front a posterior horseshoe fistula is more common than the anterior variety [5] Whereas the internal (primary) opening of a posterior horseshoe fistula is nearly always located in the posterior midline or slightly to either side the internal (primary) opening of an anterior horseshoe fistula inconstantly occurs in the anterior midline of the anus



Fig 172 Complete anorectal fistula showing internal opening at the anorectal line in the posterior mid line as is usual (a) represents the external opening Additional extensions or sinuses (b and c) are shown but these are not fistulas, inasmuch as they have not ruptured through the skin

Pathology

The evolution of a fistula may be described pathologically in three stages

I Irritation—creation of an atrium of infection (abrasion, ulceration)

II *Infection* — *inflammation* — suppuration—abscess (acute)—chronic extension by lines of least resistance

III Fistulous tract—extension to skin,

mucous membrane or organ forming a secondary opening

Irritation from causes enumerated under etiology permits entrance of pyogenic bacteria. By liquefaction of the products of inflammation, pus is formed. In the inflammatory zone about the area organization is attempted, which may or may not be completed. This barrier represents nature's attempt to prevent further dissemination. The collection of pus surrounded by inflammatory tissue is termed an abscess. Through failure to organize its wall, the abscess increases in size, extends in the line of least resistance and, depending on its location reaches the skin surface or adjacent viscera, where it ruptures producing a secondary orifice. In this way a suppurating canal remains which is known as a *fistula*. Thus each fistula presents a point of origin known as the internal or primary opening, a tract or suppurating canal and another aperture the secondary orifice or opening

The Internal (Primary) Opening This represents the point of entrance or the origin of a fistula. According to Martin[1 3] 90 per cent of pararectal abscesses originate from infection entering at the anorectal line through the crypts of Morgagni. Most frequently (80 per cent)[171] the opening is to be found posteriorly.[49 61 9] That the majority of anorectal fistulae have their internal openings at 5 or 7 on the clock, considering the posterior midline as 6 o'clock, has been explained in part by the dissections of Hiller,[90] who demonstrated the entrance of vessels from the ischiorectal

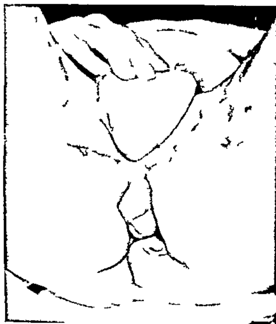




FIG 173 J B Extensive multiple fistulas Patient colostomised, with gain of 40 pounds in weight

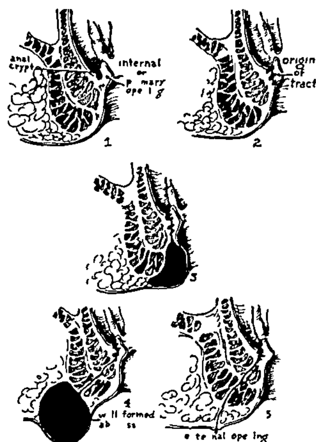


Fig 174 Evolution of abscess and fistula

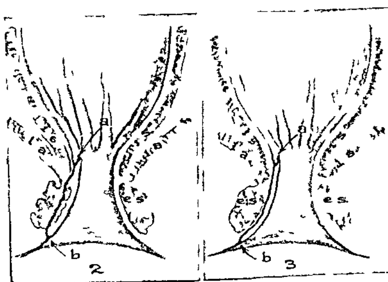


Fig 175 (*Left*) An anorectal fistula extending through superficial fibers of external sphincter muscle

Fig 176 (*Right*) An anorectal fistula superficially situated and not extending through the sphincter muscles

fossa and anal region to occur at these sites Infection, he believes, follows along these perivascular spaces Our observations confirm the occurrence of the internal opening most frequently slightly to either side of the posterior midline, which is usually the site of a crypt of Morgagni The fact should be appreciated, however, that the internal opening may be found in any portion of the rectum or, for that matter, in the anal canal

Independent of the number of tracts and external (secondary) openings present, usually only one internal (primary) aperture occurs in the intero external variety Goodsall [6] remarked, "When more than one opening is met on the same level they are usually the internal openings of separate fistulae" This is not infrequent in cases of rectal stricture especially those in the Negro race

The Fistulous Tract The channel may be straight or tortuous and single or multiple depending on the tissue involved, its point of origin and duration A fistula may extend in any direction As usually encountered, it passes in one of the following directions (a) upward, beneath the mucosa of the rectum to invade the pelvirectal space or some adjacent organ (b) outward and backward to involve the retrorectal space, and (c) downward between the internal and external sphincter muscles, through the latter muscle or superficial to it namely between it and the anal lining (Figs 175 176) In addition, after extending to one side it may pass around the anorectum in a semicircular manner and form what is known as a horseshoe fistula

The External (Secondary) Opening This aperture may appear flat in the skin surface or as a small depression At times a slight elevation may be noted, consisting of a crop of pale and flabby granulations,[8] in the center of which may be found the external opening The location of this opening is variable It may be situated in the anal wall near by in the perianal skin or several inches away Usually when single it is to be found about an inch from the anal margin The opening may occur at any point about the circumference of the anus, its location depending either on the site of spontaneous rupture representing the weakest point in the wall of the abscess or the site incised by the surgeon Although the rule is not infallible attention has been drawn to the fact that fistulae whose external openings are situated posterior to an imaginary line drawn transversely across the anus are curved and have their internal orifices in the posterior midline [60]



FIG 177 Photomicrograph of cross section of a fistula

HISTOPATHOLOGY

Microscopy reveals a sinus tract lined by granulation tissue usually richly infiltrated by small round cells and plasma cells (Fig 177) At times the walls of the tract are necrotic and in the lumen there is fibrin enmeshing leukocytes of all descriptions chiefly polymorphonuclear leukocytes The nuclei of these cells are in many instances pyknotic or are fragmented Usually the fibrous connective tissue proliferation about the sinus is extensive

SYMPTOMS

Since fistulae are invariably preceded by abscess formation, patients will relate the

existence of one or more abscesses is occurring at some previous time either remote or recent Whereas the superficial abscess was attended by considerable pain, either spontaneous or incisional rupture brought intermittently and is thin and watery in character If communication has taken place with some adjacent organ, the discharge is often indicative of the organ involved For instance, a patient offering a



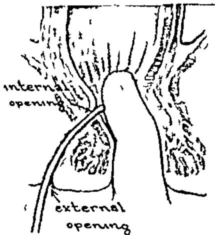
FIG 178 Multiple fistulas involving the scrotal perineal perianal buttocks and sacrococcygeal region Case apparently cured by second operation after finding internal opening at anorectal line and excision of all tributary tracts (H Z Hibshman and the author)

immediate relief, after which pus exuded intermittently for varying periods of time Only too frequently the secondary opening becomes closed and the symptoms of an acute abscess recur This is especially true in the interno external variety, or those opening into the anogluteal region

Discharge The most frequent and prominent symptom of fistula is the discharge Although the amount depends on the site and size of the abscess if the fistula has been recently formed the discharge is profuse purulent and fetid It usually is constant, thick, and yellow in color in the complete interno external variety Not uncommonly, feces and flatus escape through the external skin opening When the tract has existed for some time, the pus drains history of passing feces accompanied by urine or vice versa suggests a rectovesical fistula Pain is practically nil in fistula unless the secondary opening closes with the resultant accumulation of pus and abscess formation Most frequently a di comfort or soreness exists about the external skin orifices, which is intensified by walking or sitting Reflex phenomena may occur over the nerve pathways to some adjacent structure, as the sacrum or thigh the bladder or prostate Excoriation induced by the irritating discharge is frequent and most annoying to the patient Pruritus is not an uncommon sequela Bleeding is relatively rare and is usually due to traumatism of the skin orifice by the pressure of clothing or by manipulation, such as probing

DIAGNOSIS

The history of a previous abscess near the anus followed by a discharge is highly suggestive of fistula in ano On inspection of the perianal region, the external (secondary) opening when present, may be noted as a small depression in the skin itself in the center of an excrescence or in a scar from a former incision The aperture may occur at any site in the ano gluteal region An opening may be situated on either side of the anal orifice as in a horseshoe fistula or multiple openings may exist In the latter the integument often appears puckered and scarred (Fig 178) Not infrequently the area about the opening is excoriated and macerated from the irritating discharge Where the fistula has existed for some time and communicates with the skin the tract may frequently be felt as a fibrous cord beneath the skin leading from the external (secondary) opening toward the anus Many times this will not be elicited unless the skin and deeper structures are squeezed between the thumb and index finger When the outer opening is not seen or felt pressure along the course of the tract or the area suspected may cause a drop or two of pus to exude from the orifice By insertion of the gloved finger into the anal canal, the internal opening can be detected in most cases as an indentation or depression surrounded by a small area of induration This aperture is most frequently to be found at the anorectal line and to either side of the posterior commissure An anorectal fistula of the internal external variety is always complete although one opening either the external (secondary) or usually the internal (primary) may not be demonstrable clinically Probing sometimes proves unsatisfactory because of the tortuosity of the tracts yet it is the only exact means of determining the fistula in its entirety While it is true that demonstration of the primary opening warrants a more cheerful prognosis for the patient the promiscuous or careless insertion of even a small probe is usually attended by pain It has always been our practice to attempt gentle introduction and, if discomfort attends the procedure it is



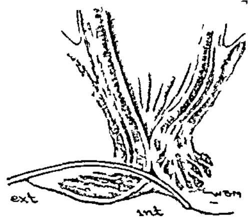


FIG 179 (*Left*) Method of demonstrating internal opening of a fistula A soft flexible probe is introduced through the extreme opening and gently advanced with the finger in the anal canal as a guide until the portal of entry is located

FIG 180 (*Right*) The probe has been advanced into and through the internal opening and drawn outside the anal aperture by the guiding finger

FIG 181 Probe

deferred until the time of operation At times the external (secondary) opening may be clouded by a covering of thin skin which is pale pink in color and quite insignificant As this is broken with the tip of the probe, a drop or two of pus will exude With the index finger in the anal canal and its tip at the anorectal line, the probe is inserted through the external opening and carefully pushed onward in an effort to follow the tract (Figs 179, 180) A straight probe (Fig 181) may suffice but when the fistula is tortuous or curved, the flexible type is preferable Time and patience must attend this procedure, since forced insertion will invariably cause an artificial opening It is simply a matter of choice whether the probe is inserted first through the external (secondary) aperture or through the internal (primary) opening The author prefers the former, although not infrequently the method suggested by Hibshman of using a crypt hook in the internal opening and advancing a probe through the external opening until the two metal ends meet is most helpful



Fig 182 Roentgenogram showing destructive process of the sacrum and coccyx This differs from tuberculosis in that the cartilage discs have been destroyed and the ventral segments are intact There is some new bone formation indicating an attempt at repair

Injection of Dyes The injection of dyes is used in the diagnosis of fistulae supposedly to determine the completeness, multiplicity and extent of the tract as well as the internal opening Our observations prompt us to believe that the procedure is very limited Various dyes are employed such as methylene blue, 5 per cent aqueous solution potassium permanganate saturated aqueous solution,"[15] iodine, lipiodol,[70] diatrast and Beck s paste[10] which consists of bismuth subnitrate 33 per cent, petroleum jelly 67 per cent Lynch[170] uses methylene blue 1 part and hydrogen peroxide 2 parts, while Newman[149] employs methylene blue in petrolagar Disadvantages of this procedure are that the dye follows the line of least resistance and often penetrates the wall of the tract and escapes into the surrounding tissue, thus masking its true ex

tent Beck's paste omits small branching tracts and frequently clogs the many channels For fistulae of the complicated variety, such as to the bony sacrum and pelvis, urethra and bladder, lipiodol or diatrast injections are always employed Thus the roentgenogram either stereoscopic or flat

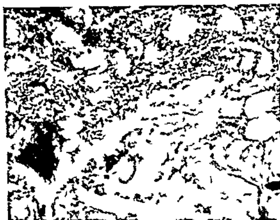


Fig 183 Photomicrograph of sacrococcygeal osteomyelitis simulating anorectal fistula (Bacon and Taylor New England M J 223 668)

the latter taken in the anteroposterior lateral and oblique planes will ofttimes permit the extent of the tract to be visualized

Differential Diagnosis A true fistula, as it is understood from the foregoing pages, consisting of a primary opening, tract and secondary opening is frequently confused with sinus as it is loosely employed In our description the term "sinus" is used to designate a tract usually inflammatory, with one end opening into some structure such as the skin mucous membrane or bone while the other end is "blind" Sinus or sinus formation is usually associated with pilonidal cyst (see p 925) It is encountered in dermoids teratomata (see p 942) in penetrating wounds pyoderma and osteomyelitis of the pelvis sacrum or coccyx [23, 71, 140] An interesting case reported by A Taylor and the author[11] simulating an anorectal fistula is reported as follows

M B a 17 year old Negress was admitted to the Proctologic Service of Temple University Hospital on November 30, 1938, with a provisional diagnosis of tuberculous fistula The patient described a creamy discharge from the anal region of 5 months duration Prior to admission she was treated by "needles" by her family physician Other history was irrelevant

Examination showed the presence of two external openings both posterior to the anal verge and approximately 1 cm from it, one was located in the midline the second slightly to the right The appearance of the openings was in no way unusual An area of induration surrounded each but could not be traced digitally as it seemed to be lost in the tissues of the anococcygeal region On introducing a probe into each aperture the direction was toward the coccyx, and the penetration 1 and 2 cm, respectively Repeated examination of the rectum showed no internal opening or primary lesion The general physical examination was negative Roentgenographic study of the chest and the gastro intestinal tract was negative

The x ray report of the lumbosacral spine was as follows

> There is a definite defect in the left side of the fourth sacral segment and the distal end of the sacrum is eburnated and somewhat irregular in appearance There has been an osteomyelitis of the sacrum and it is suspected that this process may still be active There has been loss of bony substance between the sacrum and coccyx and the latter is angulated acutely in relation to the sacrum (Fig 182)

Further x ray study consisted of injection of the sinuses with lipiodol and fluoroscopic examination but little or no information was gained except that there was no free communication with the rectum

The red cell count was 4,430 000 and the hemoglobin 12 5 Gm The white cell count was 11 250 with 81 per cent polymorphonuclears 17 per cent lymphocytes 1 per cent eosinophils and 1 per cent basophils Blood Wassermann Kolmer Kahn and Kline tests were negative A complement fixation test for gonococcal infection was negative The sedimentation rate was 11 5 mm in 1 hour

With a provisional diagnosis of sacrococcygeal osteomyelitis resulting in sinus formation simulating anorectal fistula operation was performed by one of us (H E B) under avertin and nitrous oxide anesthesia By careful probing and injection of methylene blue in petrolagar the sinuses were found to extend directly to the coccyx and sacrum Both tracts were widely excised and the coccyx and lower

sacral segment were removed The wound was left open and permitted to heal by granulation

Gross section of the tissue showed no cystic formation The microscopic report was as follows (Fig 183)

The epithelium is hyperplastic with increased surface keratinization The epithelial pegs are distorted and elongated the corium is thick and sclerotic There is a perivascular mononuclear cellular infiltration the predominant cells of which are plasma cells Some thickening of the vessel walls is noted Another section of the corium shows chronic granulation tissue with proliferative fibrosis and cellular infiltration Most of the cells are plasma cells Sections of bone show some necrosis of the spicules and infiltration of the marrow with fat and a chronic inflammatory reaction of the periosteum as well as of the bone There is no evidence of tuberculous infection Diagnosis chronic inflammation and osteomyelitis

Following operation, the wound was packed lightly with dichloramine T gauze A heat cradle was employed and ultraviolet light therapy given each day The patient was discharged to her family physician 17 days after operation The wound was completely healed 6 weeks later



Fig 184 Operative wound seven days following removal of the coccyx and lower sacral segments

Complications and Sequelae

Among these may be mentioned recurrent abscesses, perirectal cellulitis, fissure, proctitis, stricture[18] and carcinoma[3, 50, 60, 98, 107, 104, 110, 138, 140, 150, 160, 1 8, 170, 18, 11] Constitutional effects, such as loss of weight general debility and mental depression, are commonly encountered At times the infection may be virulent enough to cause death

Prognosis

Fistula having their origin at the anorectal line or within the rectum will not heal without surgical intervention, which calls for thorough incision through the entire extent of the tract The simple complete fistula of the interno external variety (skin to anorectal line) offers excellent results, providing the internal opening is found Equally as good results may be anticipated in multiple fistulae (complex) if the internal opening is demonstrated and the branching tracts are freely incised, permitting good drainage to take place In the event that the original opening is not located the recur

rence of a suppurating tract will ensue Complicated fistulae as those involving bony structures or adjacent organs as well as those associated with some debilitating disease, as tuberculosis, ulcerative procto

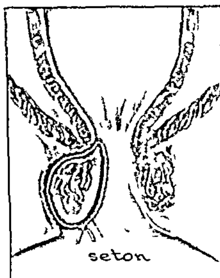


FIG 185 Illustration of seton passing completely through the fistula and tied outside the anal aperture

sigmoiditis or malignancy offer less encouraging results

TREATMENT

Nonsurgical General consideration in the treatment of fistulae as regulating the diet for the formation of solid stools and cleanliness of the local parts are helpful adjuncts Supportive measures in cases of the debilitated are of value Hot sitz baths and the application of hot boric acid compresses are of use in promoting freer drainage and alleviating local discomfort

INJECTIONS OF CHEMICALS The purpose of this procedure is to obliterate the fistulous tract by the contraction of fibrous tissue When chemicals are injected the unhealthy granulations are destroyed which is followed by the deposition of fibrous tissue Various agents have been employed as phenol 95 per cent,[16] potassium permanganate (saturated solution) silver nitrate[11] saturated solution, tincture of iodine 7 per cent and zinc chloride 10 per cent

Comment Suffice it to say that this method and the use of these drugs is impractical and, although temporary relief may be encountered in an occasional case, the end results are very unsatisfactory Be

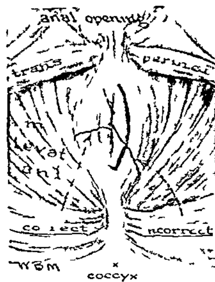


FIG 186 Horizontal line represents the correct way and diagonal line the incorrect way in which to incise the external sphincter muscle

sides, the procedure is painful and systemic reactions are not uncommon

LIGATURE OR SETON The purpose of this method[3] is to divide the tissue between the external and internal fistulous openings Some surgeons are particularly enthusiastic about this procedure It is our opinion that, when a fistulous tract is especially deep which would necessitate division of virtually all lamina of the external sphincter and a portion of the internal sphincter as well this method may be judiciously employed By the same token it may be utilized to advantage in one anteriorly placed, as (for example) an anovulvar or anoperineal fistula especially if associated with a tenuous type of perineal body In our experience the method is seldom indicated except in these few instances

Technic A silk or elastic ligature threaded on a flexible probe is passed into the external opening and through the internal opening after which the two ends



Fig 187 C F Martin grooved director

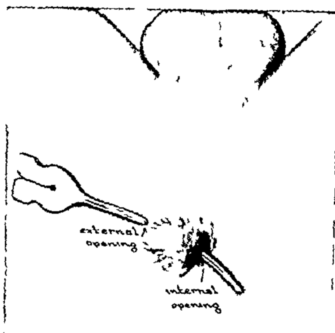


Fig 188 Grooved director extending into and through fistulous opening preparatory to incision

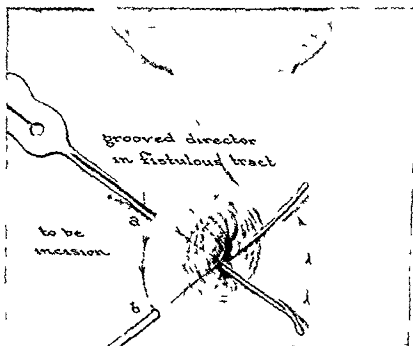


Fig 189 Complete anorectal fistula showing dotted grooved director through original external opening If the fistulous tract were to be incised in this position the sphincter muscle would be severed diagonally therefore an anteroposterior incision is carried from a to b to permit the probe to assume a position transverse to the muscle

are tied (Fig 185) At daily intervals the ligature is tightened until it finally cuts through, which usually occurs at the end of the first or second week To minimize the discomfort incident to this procedure Pruitt recommends the injection of from 0 5 to 1

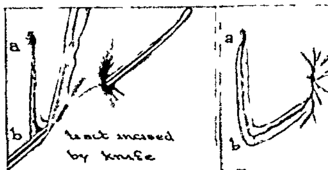


Fig 190 (*Left*) Incision through fistula using grooved director as a guide
Fig 191 (*Right*) Appearance of wound following incision

per cent quinine and urea hydrochloride solution into the tissues immediately adjacent Katsche[99] inserts a short urethral or ejaculatory duct catheter with a bulbous tip into the external opening A steel wire stylet is passed through the catheter, after which the latter is withdrawn leaving the wire in situ The wire is held taut by means of a hemostat and the bipolar cutting current is applied directly to the wire until the tissue overlying the fistulous tract is completely severed

Surgical Treatment Reasons for Failure in the Management of Fistulae In discussing the operative treatment of fistulae it is well to appreciate the cardinal reasons which account for failure An analysis of the various causes advanced by several authors[18 8 9 135 139 148 163 176 184] is summarized as follows

1 Confusion as to terminology
2 Faulty conception of the origin and course of the disease
3 Confusion regarding anatomy
4 Failure to locate the internal or primary opening
5 Failure to open lateral tracts
6 Faulty aftercare particularly prolonged packing of the wound
7 Fear of incontinence
8 Inadequate anesthesia
9 Inadequate excision of skin edges
10 Operating in the presence of infectious diarrhea
11 Mistaken diagnosis, failure to recognize bone caries carcinoma, tuberculosis or a complicated fistula (rectovaginal, rectovesical or recto urethral)
12 Lack of teaching facilities in medical schools

Anesthesia Except where the operator is reasonably sure that the fistulous tract is superficial to the external sphincter muscle, anesthesia other than the infiltration method is by all means the procedure of choice Only too frequently what appears to be a straight tract with an internal (primary) and an external (secondary) opening is found to have divergent ramifications which necessitate an extensive dissection In the presence of acute suppuration and fistulae of the complex or complicated varieties local anesthesia is contraindicated

Infiltration Method In order to analgesize the sphincter and levator muscles, as well as the superficial skin adjacent to the external skin opening, both superficial and deep infiltration is necessary

Technic (For a fistula in the posterior quadrant on the left side) A wheal is made ½ inch behind the posterior anal verge in the midline by the injection of a few minims of 1 per cent solution of procaine through a hypodermic needle With the finger in the

anus as a guide, a 22 gauge needle, 2½ inches in length is inserted through the center of the wheal and advanced parallel to and behind the long axis of the anus The plunger of the attached syringe is gently pressed until 10 cc of procaine 1 per cent or nupercaine, 0 1 per cent are injected The needle is withdrawn up to but not through the wheal and directed deeply forward and outward toward the levator muscle on the side of the fistula A second wheal is made just beyond the external opening using a hypodermic needle With a probe in the fistula as a guide a 22 gauge needle is inserted parallel to the tract first on one side and then on the other the solution being injected as the needle is advanced

Division of the Sphincter Muscle As previously mentioned, fistulous tracts may pass between the internal and external sphincter muscle (Fig 169) may penetrate the latter muscle (Fig 175) or may extend superficial to it as shown in Figure 176 therefore it is of vast importance to sever the muscle fibers according to their arrangement lest impairment of the normal defecatory mechanism or even incontinence which is a disastrous sequela result In other words the division of the sphincter should be at right angles rather than obliquely through the fibers of the muscle (Fig 186) Every effort should be made to avoid dividing the sphincter in more than one place since this will invariably result in fecal incontinence If two distinct internal openings exist with their respective tracts distal to the muscle one fistulous tract should be divided and the other similarly treated at a subsequent operation after the first one has healed An alternative is to use a seton

Fistulotomy — Incision *Description* This procedure embodies cutting through the fistulous tract by means of a knife scissors, electric scalpel or cautery with or without a grooved director as a guide (Fig 187) Scarification of the base of the fistulous tract is optional with the operator

Technic Following divulsion of the sphincter, the external opening is demonstrated and into it is inserted a grooved director The instrument is gently passed through the fistulous tract and brought out of the internal aperture within the bowel so that its tip extends beyond this opening (Fig 188) An incision is then made through the tissue proximal to the grooved director from its point of exit to the point of entrance, the grooved director being used as a guide (Figs 189, 190, 191) In this manner, the tract in its entirety is laid open The skin edges of the tract are trimmed off in order to prevent undermining, which retards healing Bleeding points are controlled by pressure or ligature

Where the Internal Opening Is Not Found If the internal opening cannot be located (see p 173), the probe is introduced into the external opening inserted as far as possible and the skin incised to this point Frequently a crypt will be found at the anorectal line which when drawn down by means of a hook, will facilitate demonstration of the internal opening Tension on the partially freed fistulous tract may cause dimpling of the crypt where the primary opening is located, thus facilitating its identification even when it appears to have healed over Should all attempts fail to locate the inner aperture, the edges of the partly incised tract are trimmed away bleeding points controlled and the wound is packed lightly with a strip of petroleum jelly or iodoform gauze In such cases, the patient should be advised that the fistula still remains and will in all probability necessitate a secondary operation

If Multiple External (Secondary) Openings Are Present In such cases, an effort should be made to determine, if possible, the original external or secondary opening If this can be done the main tract is incised as previously described and followed by free incision of the tributary or branching tracts present The muscle, however, is divided in only one site In all cases the skin edges are trimmed to insure better drainage and early healing After hemorrhage is controlled the wounds are lightly packed with gauze for 24 hours

If Two Internal (Primary) Openings Are

Present When this condition exists, only one internal opening should be divided at the first operation, provided, of course, their respective tracts are both deeply situated or extend beneath the sphincter muscle When the resultant wound has completely healed, the other internal opening with its accompanying tract is treated in a similar manner as second stage

FISTULECTOMY — INCISION *Description* In this procedure the fistulous tract is excised in its entirety Some operators prefer suturing the wound following excision but primary union seldom occurs owing to contamination by the fecal discharge For this reason alone it is to be definitely avoided Therefore by leaving the wound wide open it is permitted to heal by granulation

Technic A soft, pliable probe is introduced into the external opening and carefully passed through the fistulous tract until its distal end extends through and beyond the internal aperture (Fig 193) Then a hemostat is applied to the tip of the probe in order to hold it in place By means of scissors or scalpel an incision is made on each side of the probe beginning at the internal orifice and extending to a point just beyond the external opening As the incision is deepened, first on one side and then on the other, the scalpel is turned slightly inward so that its cutting edge points beneath the fistula in a V shaped manner Thus the fistulous tract, together with its base and fibrous walls, is totally excised in such a manner that the resulting wound will heal from the bottom upward and unite the severed structures including the sphincter ends by a block of scar tissue (Fig 194) Bleeding points are controlled by hemostats temporarily applied ligature or dia

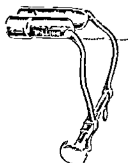


FIG 192 The N D Smith retracting speculum

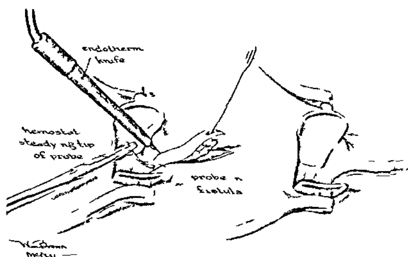


FIG 193 (*Left*) Fistulectomy Probe passed through fistula and excised in its entirety by means of the endotherm knife

FIG 194 (*Right*) Appearance of wound following excision of the fistula

thermic coagulation A strip of petroleum jelly gauze is placed in the wound for 24 hours Sterile gauze is applied and supported by a T binder In the management of an anterior fistula in the female, it will be recalled that the sphincter muscle is not strongly supported in its attachment to the perineal body anteriorly Furthermore, the female perineal body is not a fixed point When the sphincter muscle is divided in this area, the ends tend to retract and produce incontinence For this reason it is frequently judicious to introduce one or two catgut sutures figure 8' fashion into the divided ends of the sphincter

Horseshoe Fistula As previously described a horseshoe fistula is a tract which partially encircles the anorectum either in front or behind Nearly always, this type is complete, having an internal opening at the anorectal line with one or more external openings situated on each side in the perianal skin The internal opening is situated most frequently slightly to either side of the posterior midline Whereas the tract is often subtegumentary (superficial to the external sphincter muscle) in the anterior horseshoe variety it is generally more deeply situated in the posterior horseshoe type (See Chap 1, Anatomic Considerations p 20)

Posterior Horseshoe Fistula Description An attempt should always be made to locate the internal opening by digital examination by inserting a probe through the fistulous tracts or by passing it gently through a crypt that may be present This is usually to be found posteriorly at the anorectal line Whether or not the main tract is incised first or last, wide incision of all fistulous tracts is to be recommended The main tract or that leading to the anorectal line is divided through the external sphincter muscle, care being taken to cut squarely across its fibers Communication is then established (outside the sphincter muscle) between this and the lateral tracts Where there exists some doubt as to subsequent preservation of bowel function either in the posterior or anterior variety of multiple fistulae, it is always advisable to divide the procedure into two or more stages [6]

Technic The fistula having been demonstrated as to completeness, the tract is divided, a grooved director being used as a guide A probe is then inserted into the external opening on the opposite side, extending it to the above tract but outside the outer margin of the external sphincter muscle, after which all communicating tracts are freely incised

Comment The principle here laid down considering that at least one tract involved the external sphincter muscle is that the original fistula, if determined, is severed and all branching tracts are so converted that they connect into this primary incision In this manner the muscle is cut in but one place It should be remembered that careless and deep transverse division of the musculature behind the anus (between the anus and coccyx) may result in anterior displacement of the anus

In the event that the internal opening cannot be demonstrated a grooved director is inserted into that one of the tracts which in the operator's opinion, is most likely to communicate with the bowel This is then slit as far as the grooved director can be extended, and all branching or connecting passages are similarly incised

Anterior Horseshoe Fistula Description The procedure here is not unlike that mentioned under the posterior variety Effort should be made to locate the internal opening at the anorectal line It should be remembered that the internal opening of an anterior horseshoe fistula and for that matter, of all anterior fistulae, is less constant as far as the anterior midline is concerned than the posterior horseshoe fistula, or, in fact, than all posterolateral fistulae which consistently have their internal (primary) opening posteriorly in the midline or immediately to either side It is also to be remembered that usually, anterior horseshoe fistulae traverse the perineum quite superficially and that the external sphincter muscle is less frequently involved Although all fistulous tracts are incised or excised

according to the judgment of the operator, because of the anatomy of the perineum, the procedure should be more conservative, especially in the female

Technic The internal opening is demonstrated by the introduction of a grooved director into and through the fistulous tract, and the fistula is laid open by an incision, the director being used as a guide If the sphincter muscle is involved its fibers are severed at right angles Lateral tracts are then incised each being connected with the primary incision Bleeding is controlled as described under the posterior variety A strip of petroleum jelly gauze is placed in the wound for 24 hours

Anorectal Perineal and Scrotal Fistula Fistulae of this variety are not uncommon and are especially amenable to wide excision, if a few precautions are taken Having excluded genito urinary origin the patient is placed in the lithotomy position and a metal sound introduced into the urethra to facilitate the dissection A probe is introduced into the external (secondary) opening or into the internal (primary) aperture whichever is chosen, according to the individual case While the tract may be divided throughout its length (fistulotomy), our choice is to excise the fistula in its entirety Bleeding points are coagulated or ligated and petroleum jelly gauze is applied to the wound which is permitted to remain open and granulate from the base An interesting case of extensive anorectal scrotal fistula is reported herewith

E B a white 54 year old male was seen in consultation January 1945 The patient stated that following the original abscess multiple abscesses occurred to the side and in front of the rectum which ruptured spontaneously or were incised Intermittent drainage of purulent material was described with concomitant irritation and soiling of the undergarments Examination disclosed a pepper pot arrangement of the secondary openings in the perineum and at the base of the scrotum A tract from one aperture was clearly demonstrable extending into a deep pocket in the anterior phase at the anorectal line

Urethrocystoscopic examination was negative Under lumbar analgesia with the patient in the lithotomy position, a metal sound was introduced into the urethra A tortuous fistulous tract was found extending into the rectum which was excised with all adjacent communications At the site of incision of the external sphincter muscle one single figure 8 suture of #0 chromic catgut was inserted Eleven weeks were required for complete healing

Anorectal Inguinal Fistula This variety of fistula is less common, and its occurrence should arouse suspicion of a specific cause, such as tuberculosis, lues or lymphogranuloma venereum Dependent upon the case appropriate therapy should be directed thereto Only five patients with this type of fistula have been encountered Medical measures including sulfonamides (cases occurred prior to penicillin therapy) served only as an adjunct Wide surgical excision following the principles laid down for fistula in general is to be recommended The following case is of unusual interest

D G a white male 28 years old a dentist by profession was seen in consultation during October, 1943 He stated that in 1936 his first abscess (which was promptly incised) occurred to the right of the anus This was packed and the fistula drained for three months A second operation during the same year was performed A sequence of abdominal symptoms occurred which were diagnosed as regional ileitis during 1937 Preliminary ileo colostomy followed by secondary resection of the ileum and ascending colon was performed During convalescence, the abscess drained periodically For the next few years multiple abscesses with draining sinuses occurred around the rectum and in the perineum and scrotum the majority of which were incised With the advent of extension to both groins, the patient became alarmed and because of pararectal and inguinal pain sought further advice The past history was negative No history of diabetes or tuberculosis an aunt was operated upon by the author a few years previously for cancer of the rectum The examination disclosed the following observations which are from the writer's original office record

The sacrococcygeal anal, perianal, perineal as well as scrotal and inguinal skin is the site of a rather extensive infection On the right involving the entire ischiorectal fossa is an acute inflammatory process presenting ten

derness induration and fluctuation On the left there is a nubbin of granulation tissue surrounded by an area the size of a twenty five cent piece which extends by a fistula to meet that which exists in the left perianal region Some lymphedema and much tissue distortion is apparent On the left, there is

With a few preliminary studies, the abscess was incised and drained (no primary opening was disclosed) and the patient discharged three days later Culture showed the usual coliform organisms The patient was read mitted to Temple University Hospital three weeks later and extensive investigations begun



Fig 195 D G Multiple fistulas showing involvement of perineum extending to groin

an opening which admits a probe for a dis tance of about two inches One tract extends toward the rectum and the other toward the perineum Inflammation thickening and puru loid discharge are noted Anteriorly, the scro tum in its entirety shows inflammatory change In the superior portion of the left thigh, immediately adjacent to the perineal portion of the scrotum, there is another large chronic abscess but this is not very deeply placed This continues to the left scrotum and groin, where the lymph glands are enlarged There is puckering and reduplication of the folds as is commonly seen in two conditions (one) lymphogranuloma venereum and (two) regional ileitis The right inguinal nodes are swollen also The sphincter muscle is slightly increased in tone There is no spasm of either levator, piriformis or anococcygeus The mu cous membrane is freely movable over the prostate

"On proctoscopy, two small papillae are noted and residual hemorrhoidal tissue Sig moidoscopy is negative for any benign or malignant process "

Mycologic examination of smear and cultures for fungi, especially Actinomyces bovis and Blastomyces were negative Roentgenographic study of the gastro-intestinal tract, chest and pelvic bone was within normal interpretation Blood studies including culture and section of tissue from the perianal and inguinal regions revealed only inflammatory tissue " Various examinations such as the Wasserman Kolmer for syphilis, the Reenstierna for chancroid complement fixation for gonorrhea, tuberculin (P P D) and guinea pig inoculation for tuberculosis were made to no avail Sputa and feces were negative No Donovan bodies were demonstrated in the inguinal nodes Urethro cystoscopic examination disclosed no pathol ogy All available data were reviewed by Dr John Kolmer, and a therapeutic trial of vari ous sulfonamides was begun (penicillin and streptomycin not available at that time) In addition a course of fuadin was instituted

The patient was operated upon in Novem ber 1943 under lumbar analgesia A fistulous tract opening into the right lateral wall at the anorectal line was found, and from this

site all adjacent tracts communicating with the main stem were freely excised These included those in both ischiorectal regions, the sacrococcygeal areas the perineum and the base of scrotum The sphincter muscle was incised in one site only The pathologic report revealed under date of 11 13 43 #39599 chronic granulomatous reaction' Sulfonamide therapy was re employed and the patient progressed in a satisfactory manner In January 1944 the patient was readmitted, at which time approximately one third of the scrotal skin and subcutaneous layers were excised together with the infiltrated integument of the inner thighs and inguinal region as well as the glands The pathologic report revealed under date of 1 5 44 #40040 that sections of this tissue show it to be traversed by sinus formations which are lined by chronic granulation tissue In the central portion there is edema and complete necrosis Outside of this there is an intense infiltration with cells of chronic inflammation including many neutrophils Plasma cells are very common There are occasional giant cells The histology is that of a nonspecific, chronic granulomatous inflammatory reaction, which is entirely consistent with the diagnosis of lymphogranuloma venereum'

The patient made a slow but uneventful recovery

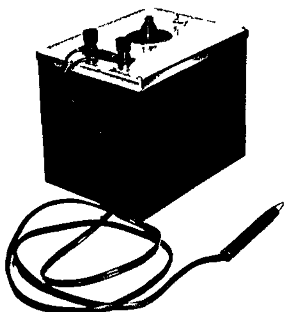


FIG 196 Faradic machine with electrode designed by Dr Henny This has been useful in determining muscle contractibility in operations for incontinence

COMPLICATIONS OF OPERATIVE TREATMENT *Hemorrhage* Although serious bleeding rarely occurs it is a most important complication and is met with both during and following operation In such a type of fistula only the smaller vessels are severed and these are readily controlled by pressure with gauze or hemostats Infrequently, a ligature of fine catgut may be required while at times the actual cautery applied directly to the wound will suffice When the larger vessels are cut in the rectum bleeding is often troublesome yet easily controlled in these cases, the bleeding point is grasped with hemostats and ligated with catgut Ordinarily we employ the surgical diathermy for coagulation of bleeding points finding it very satisfactory

Retention of Urine This was of frequent occurrence and according to Lynch occurred in approximately 90 per cent of cases Due to the intimate relationship between the innervation of the anorectal and vesical areas, interference with the nerves of the former by surgery and especially by the introduction of any sort of plug readily gives rise to spasm of the compressor urethrae muscle and the neck of the bladder resulting in retention of urine

Although the duration of this sequela is short it is extremely distressing to the patient One group of cases will respond to simple remedies, such as the removal of the plug if one is used the application of a hot water bottle or an electric pad against the perineum and hot sitz baths Permitting the patient to stand beside the bed is ofttimes very effective Ordinarily, a sterile catheter is inserted into the bladder under strict aseptic precautions after a period of from eight to twelve hours should these measures fail

The institution of a few procedures so materially lowered our incidence of urinary retention that these measures are routinely employed for all anorectal operations Our present management consists of permitting the patient to be out of bed the day following operations when hot sitz baths are

begun Prostigmine, 15 mg, to stimulate the detrusor muscle, and syntropin, 200 mg, *to relax the internal sphincter,* are given by mouth thrice daily beginning immediately after operation One bottle of beer is permitted three times each day These orders are withdrawn when urination returns to normal

Impairment of the Normal Defecatory Mechanism and Incontinence Although a most serious complication, incontinence or loss of sphincter control is relatively common, but should never occur if the proper operative technic is followed Invariably, multiple incisions, or even a single incision if it be oblique, through the external sphincter muscle, will result in this condition Prolonged packing does much to impair function and should be avoided in every case A short, flat type of anal canal, as opposed to the tubular type, renders the patient more liable to postoperative incontinence

Prolapse Due to divulsion or division of the sphincter muscle, prolapse of the lower rectal mucosa or existing hemorrhoidal tissue may occur during or subsequent to operation One may be cognizant that the latter exists, yet in the presence of considerable suppuration attending the fistula, it is at times wise to defer removal until a later period because of the danger of infection Hot applications and local astringents are beneficial The hemorrhoidal tissue may subsequently be injected with quinine and urea hydrochloride or removed surgically by one of the recognized methods

Sepsis In a great measure, this complication may be avoided by the free incision of the suppurating tract or tracts with debridement at the time of operation Infection however, frequently results from neglect or haphazard care of the wound As to treatment, pocketing and bridging over of the edges should be laid open to permit healing from the bottom When a secondary operation is required, it is best performed as soon as the decision can be made Topical application of metaphen, mercurochrome or gentian violet supported by hot compresses of saturated boric acid solution continuously applied is most helpful Later, hot sitz baths thrice daily are recommended Subsequently ichthyol or balsam of Peru and castor oil, equal parts, may be used to stimulate healthy granulations and insure good healing

THE AFTER TREATMENT of fistulae is of utmost importance During the first 24 hours compresses wrung out in hot boric acid solution are applied continuously Mineral oil, from ½ to 1 ounce, is given by mouth night and morning Where extensive incisions have been made, the packing may remain in situ until 48 or even 72 hours have elapsed Only in exceptional cases is it necessary to repack the wound After cleansing of the parts, mercurochrome, 5 per cent, gentian violet, 1 per cent or mercurophen, 1 3,000 is applied daily The application of hot compresses and the administration of mineral oil are continued as necessary On the afternoon of the first postoperative day, hot sitz baths are begun The following morning, an olive oil enema through a 14 F rubber catheter is administered

At times it may be necessary to stimulate granulations, in which case balsam of Peru alone or combined with castor oil (equal parts) is recommended Pocketing or bridging may be prevented by curettage with dry gauze Should this occur, prompt incision is indicated Exuberant granulations should be treated by means of topical applications of silver nitrate, 10 per cent, or parathiocresol 50 per cent Hot sitz baths two three or even four times daily are continued until the wound is healed

RECTOVAGINAL FISTULAE

A rectovaginal fistula is an abnormal opening between the rectum and the vagina, at any site from the vault of the vagina to the outlet This communication may vary in size from a pinpoint to one which occupies the entire height and width of the vagina it may be either short and direct,

or tortuous and of variable length, especially when caused by suppuration In the latter variety, the apertures are usually situated at different levels, although not necessarily so Rectovaginal fistulae may occur independent of or associated with a complete tear of the perineum, sphincter muscle or anterior rectal wall

Etiology Injuries consecutive to childbirth are the most common factors of this variety of fistula Usually the opening persists as a sequela to an unsuccessful attempt to close a laceration of the perineum This variety of fistula may result from direct trauma produced by the fetal head during protracted parturition or from the prolonged use of a pessary Such cases are usually first seen by the obstetrician and gynecologist although a number have been observed in consultation and a few have consulted us for repair Rape,[102] impalement by foreign bodies, careless instrumentation and surgical maneuvers, fulguration of growths and injection treatment of hemorrhoids,[1 °] even though rare, should be listed as additional causes It is seldom that a rectovaginal fistula resulting from an anorectal abscess is acknowledged yet such a condition may occur One has only to reflect upon the case of an apparently innocuous infection in an anterior crypt into which a bent probe can readily be introduced Such an inflammatory process is usually small, tender to the touch and best palpated with the index finger in the rectum and the thumb on the perineum Drainage by laying the tract open is the proper procedure but only too frequently some other form of therapy is prescribed Sufficient healing of the primary opening in the rectum may supervene with subsequent rupture of its contents through the vagina or vulva Attention has been called to this sequence previously[45]

Interstitial abscess of the anterior rectal wall and of the rectovaginal septum may be mentioned also This rectovaginal defect is encountered as a sequela to extensive inflammatory conditions of the rectum as for example chronic ulcerative proctocolitis and lymphogranulomatous stricture of the rectum Several years ago the writer was consulted relative to an inflammatory stricture of the rectum and rectovaginal fistula in a young woman of 23 years who had been given a boiling olive oil enema a few days following an appendectomy Rectovaginal fistulae may occur as a result of extension and disintegration of a primary malignancy of the rectum vagina or cervix By the same token, such a condition may follow irradiation, in which case it is usually produced by the imperfect screening of radium containers employed in the treatment of rectal, vaginal and cervical cancer[94] Our group of cases is appended in the following chart

RECTOVAGINAL FISTULA

Race	
Colored	51
White	37
Rectal stricture (lymphogranuloma venereum)	29
Malignancy of rectum vagina or cervix	20
Irradiation for rectal vaginal or cervical cancer	15
Trauma incident to labor	12
Anterior anorectal or perineal ab cess	5
Abscess of rectovaginal septum	2
Endometriosis of rectovaginal septum	1
Complication of chronic ulcerative colitis	1
Intramural abscess of rectum (anterior wall)	1
Inadvertent incision of vaginal wall during correction of rectal prolap e	1
Impalement	1
	88

The congenital fistulae 26 of which occurred between the rectum and vagina or rectum and vulva, are not included here but may be found under malformations (see chart p 95)

Symptoms The involuntary escape of flatus and fecal material per vagina is a characteristic symptom with concomitant seepage and soiling and irritation of the local parts

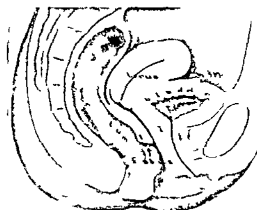
Diagnosis Ordinarily, the nature of the condition is obvious upon inspection of the vaginal and rectal wall Where the opening is minute and difficult to visualize milk previously instilled into the rectum may be noted as it escapes into the vagina The

parts should be carefully inspected for associated pathology, such as carcinomatous infiltration or lymphogranulomatous stricture. An interesting case was recently reported by Moir[14] in which the rectal prolapse inverted through the rectovaginal fistula.

pendent of the type of surgical procedure employed. Therefore, the following rules are recommended:

1. Removal of fistulous tract in its entirety.

2. Complete excision of all fixative scar tissue.



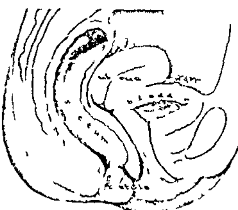


FIG 197 (*Left*) Rectovulvar fistula
FIG 198 (*Right*) Rectovaginal fistula

Treatment. While our experience with fistulae of the rectovaginal variety may be considered fairly large by some, our results have not been proportionately satisfactory as to cure excepting the various procedures employed for the total group. For example, until a decade ago we were not too careful about closing fistulae in the presence of an apparently quiescent pararectal infection, commonly occurring in lymphogranulomatous stricture; relatively no special care was administered prior to and following operation and attempts to close the communication were invariably performed by cauterization or by the intrarectal and intravaginal method of suture. It may be mentioned that in some instances an inguinal colostomy was done with subsequent repair of the fistula which was invariably successful, yet, upon closure of the sigmoidostomy, a recurrence of the fistula developed. Experience has shown that, with meticulous preoperative and postoperative care and adherence to a few fundamental principles, a permanent and satisfactory closure of the fistula may be effected inde-

3. Individual closure of both rectum and vagina.

4. Reconstruction to as near a normal relationship as is possible.

5. Approximation without tension, employing layer by layer method of suture.

6. Use of fine catgut or wire sutures.

7. Divulsion of sphincter muscles.

Preoperative Management. The care of these patients prior to operation is similar to our preparation for those undergoing resection (see p 995). One week in the hospital, a nonresidue, reinforced diet, a daily vaginal douche and rectal irrigation until the return runs clear on aspiration the morning of operation, and administration of nonabsorptive sulfonamide, sulfasuxidine or sulfathalidine comprise the usual routine.

Surgical Treatment. The procedure to be outlined—in part at least—depends upon the etiology and the local pathology present. Our usual plan of approach is by one of two methods.

(A) The first method is employed where the sphincter muscles are normally intact

and the rectovaginal fistula lies above the perineal body With the patient in the lithotomy position, the rectum is loosely packed with antisepticized gauze A curvilinear incision of the Young type is made transversely across the perineum By deep body, vaginal wall and fistulous tract, is carried to a point approximately two centimeters above Thus the rectal wall has been incised for a distance of but little more than the length of the fistula With the vaginal flaps retracted anterolaterally, the

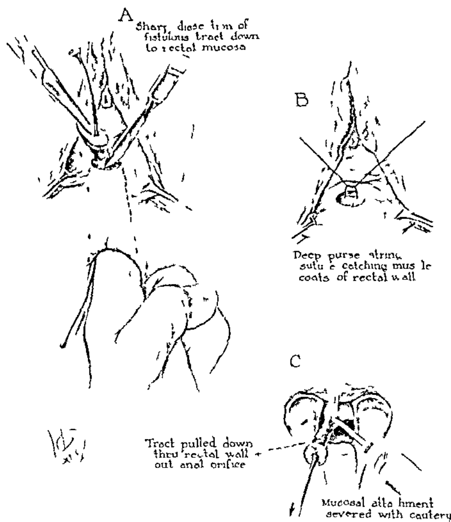


Fig 199 Davids method of repair of rectovaginal fistula

ening the incision the sphincter musculature and anal canal are retracted posteriorly The vaginal wall is separated from the rectal wall by blunt and sharp dissection until the scar tissue surrounding the fistula is reached At this site separation is continued widely to completely circumvent the fistulous tract Beginning at the anterior portion of the perineum a straight incision completely through the remaining perineal margins of the rectal wound are excised and sutured layer by layer in a transverse fashion using fine chromic catgut The edges of the vaginal fistula are then freshened and sutured with two rows of similar material As the perineum is reached two or at the most three interrupted sutures of alloy steel wire No 32 gauge are introduced A small perforated metal or rubber drain is introduced between the rectum and vagina

parts should be carefully inspected for associated pathology, such as carcinomatous infiltration or lymphogranulomatous stricture An interesting case was recently reported by Moir[13] in which the rectal prolapse inverted through the rectovaginal fistula

pendent of the type of surgical procedure employed Therefore, the following rules are recommended

1 Removal of fistulous tract in its entirety

2 Complete excision of all fixative scar tissue

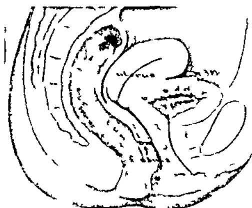




Fig 197 (*Left*) Rectovulvar fistula
Fig 198 (*Right*) Rectovaginal fistula

Treatment While our experience with fistulae of the rectovaginal variety may be considered fairly large by some our results have not been proportionately satisfactory as to cure excepting the various procedures employed for the total group For example until a decade ago we were not too careful about closing fistulae in the presence of an apparently quiescent pararectal infection commonly occurring in lymphogranulomatous stricture relatively no special care was administered prior to and following operation, and attempts to close the communication were invariably performed by cauterization or by the intrarectal and intravaginal method of suture It may be mentioned that in some instances an inguinal colostomy was done with subsequent repair of the fistula which was invariably successful yet, upon closure of the sigmoidostomy, a recurrence of the fistula developed Experience has shown that with meticulous preoperative and postoperative care and adherence to a few fundamental principles a permanent and satisfactory closure of the fistula may be effected inde

3 Individual closure of both rectum and vagina

4 Reconstruction to as near a normal relationship as is possible

5 Approximation without tension, employing layer by layer method of suture

6 Use of fine catgut or wire sutures

7 Divulsion of sphincter muscles

Preoperative Management The care of these patients prior to operation is similar to our preparation for those undergoing resection (see p 995) One week in the hospital a nonresidue, reinforced diet a daily vaginal douche and rectal irrigation until the return runs clear on aspiration the morning of operation, and administration of nonabsorptive sulfonamide, sulfasuxidine or sulfathalidine comprise the usual routine

Surgical Treatment The procedure to be outlined—in part at least—depends upon the etiology and the local pathology present Our usual plan of approach is by one of two methods

(A) The first method is employed where the sphincter muscles are normally intact

neal resection (Miles) or proctosigmoidectomy that combined the Murphy Tuttle type of excision of the posterior vaginal wall in a manner that also included the fistula In one of our patients (see p 883) suffering from extensive stricture and rectovaginal fistula, a proctosigmoidectomy with resection of the descending colon and splenic flexure was performed as a one stage procedure with the transverse colon transplanted to the anus In this, the Murphy Tuttle type of vaginal excision was incorporated In another patient with a factitial rectal stricture following irradiation for a cervical cancer a successful extirpation was effected A similar report is cited by Black and Wanger[115] and still another by Lovelady [0] Ordinarily, rectovaginal fistulae resulting *from extension of a vaginal or cervical* malignancy are best treated by a proximal colostomy with subsequent irrigation of the lower loop, using a solution such as potassium permanganate 1 to 8 000, daily

RECTO URETHRAL FISTULAE

A recto urethral fistula is an abnormal tract or communication between the rectum and urethra Obviously it occurs only in males Fortunately, the condition is infrequent for it is often difficult to cure The congenital variety has been discussed under Malformations (Chap 3) and will not be repeated here While a group of 63 cases was collected by Cripps only scattered reports are to be formed in the literature [1 43 47 67 80 81 107 133 1 4 191 30 13]

Etiology Many factors contribute to the cause of fistulae in this site and for the most part are urogenital in origin Direct trauma operations on the perineal structures wounds stricture foreign bodies neoplasms suppurative processes and interference with the vascular supply may be listed as causes Wilhelm [96] reported a series of 18 cases of recto urinary fistula covering a 21 year period 13 of which were his own

The etiology is listed in the accompanying chart



FIG 201 Cystoscopic view in a case of vesicorectal fistula (L E McCrea)

- A Traumatic
  - 1 Instrumental
    - a Perforation by sound
    - b Perforation by cystoscope
  - 2 Postprostatectomy
    - a Transurethral resection
    - b Perineal prostatectomy
      - 1 Benign
      - 2 Carcinoma
- B Inflammatory
  - 1 Acute infection
    - a Prostatic abscess
    - b Perirectal abscess, imperforate anus
  - 2 Chronic ileitis ileorectovesical fistula
  - 3 Tuberculosis of bladder with calculus
- C Neoplastic
  - 1 Prostatic carcinoma
  - 2 Rectal carcinoma
  - 3 Ovarian carcinoma rectovaginovesical fistula

Our experience presents a somewhat different aspect as *noted in the following*

Primary carcinoma of rectum or sigmoid with extension to prostate bladder or urethra	37
Operation	
Abdominoperineal resection or proctosigmoidectomy with prostatectomy partial or complete	8
With resection of urethra (partial)	7
With cystectomy (partial)	9
Case of sigmoid and bladder with extension and fistula involving vagina bladder rectum and ileum Resection of sigmoid and ileum upper vagina portion of the bladder—subsequent rectorrhaphy (4 operations patient living and well)	1
	25

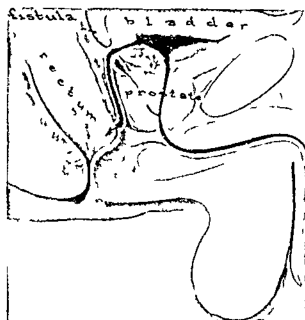


Fig 200 Rectovesical fistula

to a point just above the suture line in the bowel The skin of the perineum is approximated with interrupted sutures of alloy steel wire No 35 gauge and their ends are cut long for removal at the end of the sixth or seventh day Finally the gauze packing is removed from the rectum and the sphincters divulsed The septal drain is removed at the expiration of from 24 to 36 hours

(B) The second method is based on the principle of Warren [00] popularized by Tait Known as the 'flap splitting' procedure it is particularly well designed for rectovaginal fistulae associated with complete laceration of the perineum, where concomitant rupture or tear of the sphincter muscle has occurred in the anterior midline with retraction, atrophy and deposition of fibrous tissue A curvilinear incision is made transversely across the perineum as previously described, carried from each terminus forward and backward on each side in the form of the letter "H" The lateral phases close to the anus are undercut until the ends of the sphincter muscle are identified and for this purpose the faradic current stimulator has proved helpful A sizable bundle of the muscle is mobilized for future plication Instead of making a vaginal flap or apron, the vaginal wall is separated from the rectal wall until the anterior margins of the levator muscles are clearly defined With a retracting speculum in the anal canal, a midline incision is carried through the anal wall, through the perineum between the ends of the sphincter, through the length of both the posterior vaginal and anterior rectal walls and through the fistulous tract to a site approximately two centimeters above The margins of the fistulous tract are freely excised together with all fixative scar tissue It is essential to separate the vaginal from the rectal wall for subsequent closure of each wall must be a distinct entity The rectal wound is closed in layers using fine chromic catgut, the mobilized sphincter muscles are approximated with two or more figure "8" sutures of similar material The ends of the conjoined tendon lend themselves well to plication and suture of their fascial extremities for support For approximation of the margins of the levator, our choice is alloy steel wire interruptedly placed The vaginal wall is closed with two layers of fine catgut, while for the skin alloy steel wire, No 35 gauge, is employed A 28 gauge rubber catheter, inserted into the rectum, the tip of which should be above the site of the fistula, is stitched in place

Postoperative Care Ordinarily the patient is confined to bed for a week during the major part of which time attempt is made to prevent evacuation of the bowel by diet and the administration of paregoric Reinforced parenteral feedings are employed only water and tea being permitted by mouth Sulfasuxidine in suspension form is given orally, and by rectum through the rubber tube every six hours for the entire period The rectal tube is removed at the expiration of four or five days after which one half of this sulfonamide is instilled by means of a small syringe into the rectum

Comment It should be mentioned that, in a few instances where an extensive rectal stricture was associated with a rectovaginal fistula, we have instituted such procedures as colostomy followed by posterior resection (Lockhart Mummery) abdominoperi

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Etiology Many factors contribute to the cause of fistulae in this site and for the most part are urogenital in origin Direct trauma operations on the perineal structures wounds, stricture, foreign bodies neoplasms suppurative processes and interference with the vascular supply may be listed as causes Wilhelm [96] reported a series of 18 cases of recto urinary fistula covering a 21 year period 13 of which were his own

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    - 2 Carcinoma

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Case of sigmoid and bladder with extension and fistula involving vagina bladder rectum and ileum Resection of sigmoid and ileum upper vagina portion of the bladder—subsequent rectorrhaphy (4 operations patient living and well)	1
	25

Primary carcinoma of bladder with fistula to rectum or sigmoid		7
Diverticulitis with fistula between sigmoid and bladder		9
Resection	5	
Congenital fistulae (cited under Malformations)		
Recto urethral		3
Operations in 3		

quently, the passage of flatus and feces through the urethra offer little difficulty in making a diagnosis Where doubt exists the instillation of milk or methylene blue into the urethra will usually prove helpful A differential point is that, in recto urethral

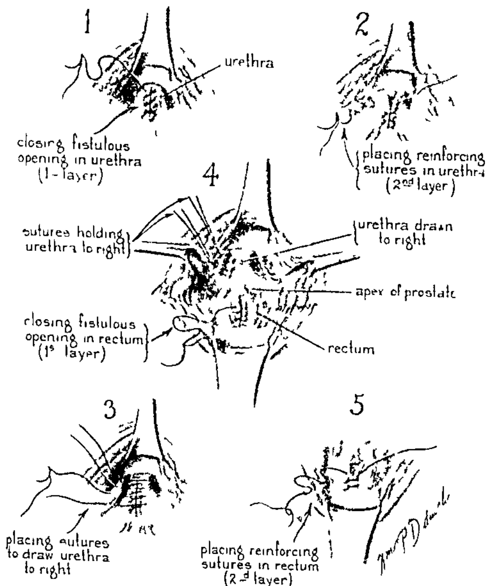


FIG 202 (Lowsley, O S, and Kirwin T J Clinical Urology, Baltimore Wilkins)

Rectovesical		
Operations in 2		2
Rectovesicoperineal		1
Operation	1	
Tuberculosis of rectum and prostate and urethra		1
Perforation from fence spike		1
Urethral stricture (gonorrheal) with extravasation to perineum and through the anal canal		1
		66

Symptoms and Diagnosis The leakage of urine from the rectum and, less fre

fistula the urine escapes by rectum during urination whereas in rectovesical fistula the urine escapes more or less constantly, independent of micturition

Treatment Usually the condition is difficult to cure While an occasional case may close spontaneously, it is the exception rather than the rule Ordinarily, no surgeon personally encounters a sufficient ber

of such cases excluding those that are in operable because of processes such as extensive malignancy, to render a worthwhile opinion and contribute to the curative management From the combined experiences

PREOPERATIVE PREPARATIONS Aside from suprapubic and urethral drainage, the care prior to operation should include daily irrigation of the rectum and the use of non absorbable sulfonamides, which are admin

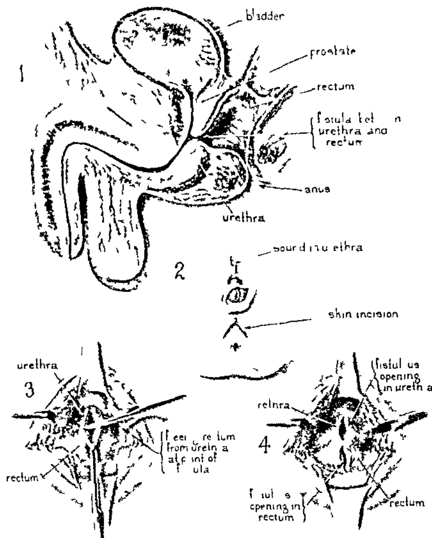


FIG 203 (1) and (2) Fistulous opening in the urethra is closed (3) Sutures are inserted to draw the urethra to the right side (4) The urethra is drawn to the right and the fistulous opening in the rectum is closed (Lowsley O S and Kirwin T J Clinical Urology Baltimore Wilkins)

of others notably Young a few basic principles should prove of utmost assistance, namely preliminary suprapubic drainage and urethral drainage establishment of a temporary colostomy in stubborn or recurrent cases and the employment of a fine suture material steel alloy wire is preferable except for the mucosal layer of the urethra

istered both orally and by rectum (See Preoperative Management Chap 28)

SURGICAL TREATMENT Our preference for the repair of recto urethral fistula is after the technic devised by Lowsley [116, 11] Both the fecal and urinary streams are diverted as a preliminary measure The patient is placed in the lithotomy position the sphinc

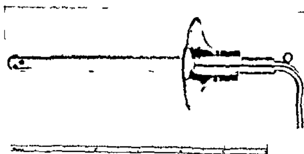


Fig 204 McCrea suprapubic drain

ters are divulsed and a metal sound is introduced into the urethra An inverted "V" incision is made across the midline of the perineum and the dissection is deepened until the fistulous tract is encountered Traction on the urethral sound and pressure through the rectum on the anterior rectal wall will give prominence to the fistula After separating the perineal structures adjacently the fistula is divided The urethral orifice is closed using fine plain catgut sutures for the mucosa and chromic catgut or alloy steel wire for subsequent layers The rectal wound is treated in a similar fashion Lowsley is quite definite in his recommendation that the repair of the urethral wound be drawn to one side and the repair of the rectal wound be drawn to the opposite side Interrupted wire sutures No 32 gauge, are inserted to approximate the perineal tissues and No 35 for skin A small perineal gauze drain is introduced for a period of from two to three days Finally, the sphincters are divulsed The suprapubic drain is removed between the fourteenth and twenty first day during this time a Babcock sump is attached for continuous suction The colostomy is closed after a period of six weeks

Based largely on the Whitehead operation [03] for hemorrhoids Ziembicki [714] and later Wildbolz [05] devised an operation for the repair of recto urethral fistula which, as modified by Young and Stone,"[13] has become particularly popular in the surgical approach to this very difficult problem The technic is described as follows

A suprapubic cystotomy is performed through a small midline incision in the lower abdomen, immediately above the pubis The bladder is opened and a perforated metal drain inserted Closure around the drain is effected by wire sutures interruptedly placed layer by layer Approximately one week later, the patient is placed in the exaggerated lithotomy position and the rectum packed with antisepticized gauze An incision is begun in the perineum at a point midway between the base of the scrotum and the anal margin and carried posteriorly to encircle the anus

Our plan of approach differs in a few details, in that the operation is begun as in performing a perineal proctosigmoidectomy or the perineal portion of an abdominoperineal proctosigmoidectomy Here, the margins of the anus are retracted by the application of Pennington clamps (Fig 502, p 743) An incision is carried circularly through the anal epithelium ¼ inch below the anorectal (dentate or pectinate) line Flat clamps are applied to these edges and separation is begun from the surrounding sphincter musculature The lower rectum is freed by sharp and blunt dissection lateral mobilization is simply performed, but fascial division in the posterior phase from the coccyx and lower sacrum is necessary A short urethral catheter or tractor is introduced into the rectal portion of the fistula and advanced toward the urethral orifice An incision is made anteriorly from the anterior midline in the anal skin to a point midway between this site and the base of the scrotum The incision is deepened until the fistula, rendered prominent by the metal urethral tractor is identified Having removed the tractor, the fistula is divided transversely In closing the urethral aperture, the edges are freshened and the mucous membrane approximated with fine catgut sutures The prostatic and periprostatic fascia are then sutured with alloy steel wire No 32 gauge interruptedly placed Additional mobilization of the rectum may be indicated according to the individual case but since the rectal fistula must be evidenced well outside the anus it is better to be assured of complete mobility The



FIG 205 M W age 69 (*Left*) Urethrogram after injection of skiodan through artificial opening in perineum above anal opening demonstrates a fistulous tract from urethra to perineum (*Right*) Opaque enema study showing constriction of distal sigmoid and proximal rectum by a perirectal or extrinsic process

rectum is divided transversely immediately above the fistulous opening which point should be at least five centimeters distal to the anal margin This allows for retraction A rubber tube No 28 gauge is tied into the rectum for 72 hours No sutures are introduced between any portion of the bowel and the surrounding tissue A small strip of iodoform gauze is inserted into the perineal wound for 48 hours The perineal skin is approximated using interrupted sutures of alloy steel wire, No 35 gauge Finally a perforated metal drain is inserted into the presacral space for 24 hours The suprapubic McCrea drain from the preliminary operation is withdrawn between the tenth day and the fourteenth day

An unusual case of abdominorectal and urethroperineal fistula is cited as follows

M W (B 4318) a white male aged 69 was referred in March 1943 His history is briefly as follows In 1897 after consultation with several physicians because of lower abdominal and rectal pain he visited the late Dr Chambers DaCosta who operated upon him for appendicitis He remained in the hospital over a year becaus of a draining abdominal fistula Into this he inserted gauze each day but finally resorted to a tube Six months later he was advised that an abdominorectal fistula existed The patient had experimented upon himself by injecting a colored solution into the abdominal opening which escaped through the rectum In 1934 he consulted a urologist because of urine escaping from an opening in front of the anus This was observed only during micturition Two unsuccessful attempts at closure were made Past and family history were irrelevant Examination disclosed a small fistulous opening in the right lower quadrant of the abdomen It appeared closed but a probe was easily introduced The perineal skin showed a curvilinear transverse scar in the center of which were a small aperture through which urine was dribbling and two larger scars to the left and right of the anus The rectum was stenosed by a firm process distinctly extrarectal involving the right pelvirectal space and extending to the anterior midline The mucosa above and below was free of ulceration A diagnosis of chronic pelvirectal abscess abdominorectal fistula and perineo urethral fistula was made The author s comment to the referring physician is quoted as follows

'This indeed is a most interesting and unusual case but as we analyze it further it does not relegate itself into one of such extreme rarity A few years ago I was fortunate enough to have come under my care five cases of pelvirectal abscess which simulated appendicitis This patient believes he had a rectal abscess in the beginning, and truthfully I think he is right In other words it is my opinion that originally a right sided supralevator abscess was present and that the

peritoneal symptoms were interpreted as appendicitis that such was drained intra abdominally with resultant fistula between the pelvirectal space and the abdominal skin Over a period of years, the inadequate drainage from above has permitted the pelvirectal infection to break through the rectal wall, thus establishing an abdominorectal fistula It is reasonable to assume that the infection circumvented the bowel extrarectally to involve the urethral and perineal structures ’

The patient was hospitalized and carefully studied The first operation consisted of closing the abdominal fistula from above which was effected without incident At the second operation excision of the perineal urinary fistulous tract emerging at two points through the skin of the perineum and at a third point through the retrobulbar pouch into the bulbous urethra was effected His postoperative course was uneventful but a few weeks later urine escaped through one site in the perineum At the third operation the tract was followed and dissected from the bulb A direct communication existed between this area and the right pelvirectal space A fourth procedure included a division of the bowel wall with wide drainage On 4 23 41, examination disclosed no evidence of recurrence of the urinary fistula, but the patient was more discouraged than ever, because the drainage from the rectum was more profuse The patient was again hospitalized and the right pelvirectal space explored through the customary extrarectal incision The inflammatory tissue was widely excised the edges of the rectal wall freshened and closed as could be effected with alloy steel wire The pelvirectal space was permitted to remain open Several months were consumed for closure The patient returned to his home in a distant city and was not seen thereafter although under date of November, 1944, he advised by letter "I feel that the fistula in the rectum has closed because I have experienced no gas or discharge The stools are semi solid I have some difficulty with urination but there is no escape of urine in front "

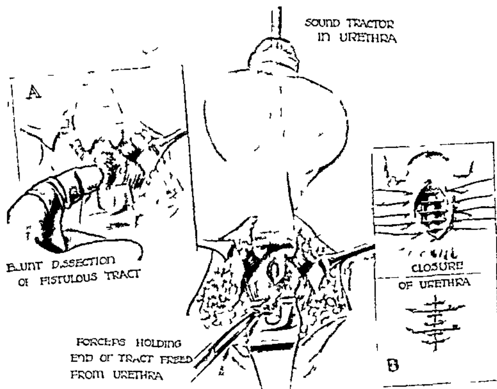


Fig 206 Successive steps in the exposure of the deeper perineum with the sound tractor in place (A) The isolation of the fistulous tract the excision of the tract and (B) the double sutured urethral opening (Watson and Knapp)

Watson and Knapp [91] have recently suggested a simplified technic based on the original method of Young and Stone The technic is as follows

The first step consists of a suprapubic

cystotomy for diversion of the urinary stream A "sound tractor" is inserted into the urethra as a guide, to be used later as an aid in drawing down the vesicle neck and better mobilizing both urethra and rectum Curved incision is made in the perineum and ischiorectal fossa, located by finger on each side and enlarged The resultant development of the spaces is carried down along the prostatic lateral mar

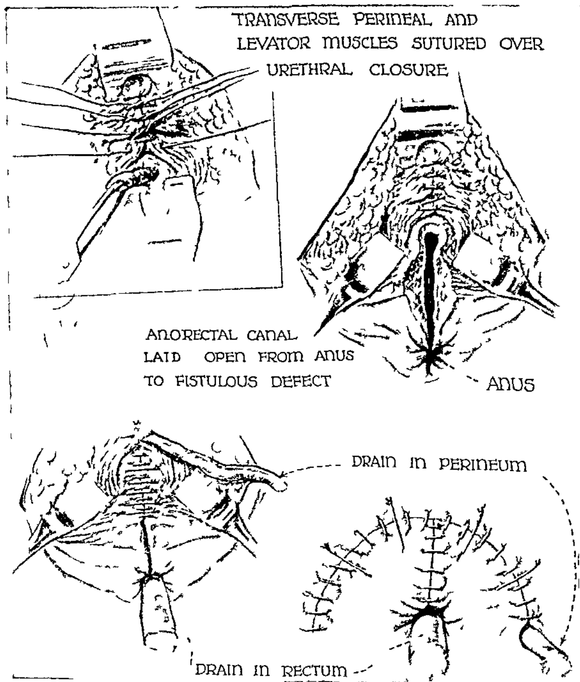


Fig 207 Steps in the closure of the perineal space The levators are brought together, the transversus is brought together a portion of it over the levators, thus thickening the perineal pad The rectal sphincter is brought together with one line of sutures supported by four or five larger supporting sutures (Watson and Knapp)

gin on each side by still further separation of the prostate and by finger dissection from the rectum, it is possible to approximate both index fingers beyond the fistulous tract in the midline giving a half inch or more of mobilized rectum above the rectal fistulous opening The bifid posterior prostatic tractor is then placed cephalad to the rectum and traction applied With both sponge and scalpel dissection the fistulous tract entering the urethra is isolated and cut off from the urethra The freshened urethral edges are approximated by two lines of small, chromic interrupted sutures the patient s legs are approximated to insure lessened tension on the perineum and freshened transversus perinei edges are sutured together these are then brought down above the next sutured edge of levator ani, making a thick perineal pad The finger is inserted into the rectum and the fistulous stoma identified, the sphincter is cut across, with subsequent fistulectomy The freshened edges are then sutured by a double line of #1 chromic catgut A small drain is placed cephalad to the rectal sutures and caudad to the levators The subcutaneous tissues and skin are approximated

TUBERCULOUS FISTULAE

The century old idea that all or the majority of anorectal fistulae are of tuberculous origin has been disproved by clinical and scientific investigation Tuberculous fistulae are rarely primary in fact it is well established that they nearly always occur subsequent to or as the result of tuberculosis elsewhere Consistent with this, we have the expression of Chisholm[35] that tuberculous fistulae and ischiorectal abscesses are practically limited to individuals with pulmonary tuberculosis as evidenced by clinical and roentgenologic examination Clarke[38] found tuberculous fistulae to be 13 times more common in tuberculous males than in nontuberculous types Apparently the presence of a primary site was appreciated, for he remarks There is evidence that 61 per cent of cases of fistulae subsequently develop pulmonary tuberculosis " This should not be interpreted that the tuberculous fistulae are primary but rather that the pulmonic process was unknowingly present Even as early as 1854, Quain[109] mentioned that there is a proneness to the formation of fistula among those laboring under phthisis Quite distinct from our first remarks is the opinion of Thoss,[19] who believes rectal fistulae to be of tuberculous origin in the majority of cases The literature on this subject is vast and profoundly confusing, so that to quote at length the opinions of various authors would avail us little so far as a clear understanding is concerned Essentially, the problem resolves itself into one based necessarily on a statistical survey from which the relative percentages may be evaluated At the same time we must be able to answer those questions which confront us, namely, how many cases of fistulae are tuberculous? How frequently do patients with fistulae have tuberculosis elsewhere? How often do tuberculous individuals have fistulae? Finally, in what proportion of cases do tuberculous fistulae occur in tuberculous patients? A rational way to seek these answers is to select several substantial series of cases from authentic sources which have been investigated by one or more of the recognized methods For the purpose of clarity, the available data are grouped under four headings, as follows

Survey

I Of fistula cases—the occurrence of tuberculous fistulae

II Of fistula cases—the occurrence of associated tuberculosis

III Of tuberculous patients—the occurrence of fistulae

IV Of tuberculous patients—the occurrence of tuberculous fistulae

Incidence

So far as age is concerned the greatest incidence has been found in patients between twenty and forty years[14] According to sex tuberculous fistulae appear to be

I Occurrence of Tuberculous Fistulae

Author	Number Cases	Tuberculous Fistulae		Per Cent	Determined by
Gabriel[69]	30	6	or	20	Guinea pig inoculation
	45	4		9	Histopathology
Buie[29,30]	1 000	22		2 2	Histopathology
Tung[194]	102	26		25 5	Microscopy
Gaston and Hogan[4]	32	3		9	Microscopy
Melchior[131]	197			61	Microscopy
Frey[68]	42			6 9	Microscopy
Bacon[10]					
Collected cases	402	7		1 7	Guinea pig inoculation Histopathology
Martin C I[1 4 1]					
Private cases				3–5	Histopathology
Stone[1 8]	10	1		10	Microscopy
Lockhart Mummery[114]				20	Guinea pig inoculation
Bliss[1]				18 7	
Miles[134]				14	
Gant[7]	5 000	500		10	
Hibshman[8]				5	
Hayes[86]				2–5	
Berry	202			18.3	
	160			10 6	
Jackman and Buie[131]		600		7–8 %	Histopathology and Guinea pig inoculation

II Fistula Cases Associated with Tuberculosis Elsewhere

Author	Number Fistulae		
Pennington[1 9]			
Collected cases	01	Tuberculosis associated in 94 cases or	13 4%
Wunderlich[99]	1 632	Tuberculosis associated in 234 cases or	14
Hartmann[83]	600	Tuberculosis associated in 180 cases or	30
Bryant[6]	183	Tuberculosis associated in 3 cases or	1 6
Gaston and Hogan[4]	108	Tuberculosis associated in 14 cases or	12 9
Stone[188]	31	Tuberculosis associated in 20 cases or	64 0
Tuttle[196]			50
Goez			45
Cripps[46]			10–15
Greffrath[9]			16
Drueck[6]			10–14
Allingham			14
Meyer[13]			9
Jackman and Buie[1 1]	600		1 5

FISTULA

III Occurrence of Fistulae in Tuberculosis Patients

Author	Number Patients	Number Fistulae		Per Cent
Leslie[108]	9 079	55	or	0 6 %
Hennigar[86]	4 160	21		0 5
Rankin Bargen and Buie[1 0]	9 668	264 abscess fistulae		2 73
Collected cases				
Fansler[6]				0.33
Cooke[41]				2 0
Morgan[141]				4 0
Drueck[0]				5.0
Edwards[9]				5 0
Evans[6]				6
Yeomans[1]				6
Martin C I[1 4]				7

IV Occurrence of Tuberculosis Fistulae in Tuberculous Patients

Author	Number Cases	Tuberculous Fistulae	Per Cent	Determined by
Chisholm[37]	31 active pulmonary	24	or 77	
	18 inactive pulmonary	10	or 55	Guinea pig inoculation and culture
Martin C L[1 4] (1933)	55	32	or 56	Histopathology
(1932)	20	14	or 72	Histopathology
Clark[38]	109 active and inactive pulmonary	5	or 4 6	Histopathology
Fansler[4]			15	Guinea pig inoculation
Martin C L[1 8]			90	Microscopy

more common in men than in women ratio of 2 to 1[1 4]

Etiology

Tuberculous fistulae of the anorectal region may be due to either the human or bovine type of bacilli[17 153] Gant estimated the former was responsible in 98 per cent of cases Invasion by the *Myco tuberculosis* may occur in several ways

Intestinal By swallowing sputum, in a patient suffering from active pulmonary tuberculosis, and the ingestion of food and milk laden with the tubercle bacilli, a localized infection in this area may be brought about It is interesting to note that the investigation of Brown[7] showed that in 63 per cent of cases in which intestinal and pulmonary tuberculosis were associated, cavitation was demonstrated in the lungs by roentgenogram

Blood—hematogenous

Lymphatics—lymphogenous

Direct extension from other structures such as the sacrum, the coccyx or the pelvic bones or organs such as the seminal vesicles, prostate or urethra

Direct contamination as from hands or thermometers laden with the tubercle bacilli[73 1 4]

Pathology

Tuberculous fistulae usually have their origin at or in the close vicinity of the anorectal line Evidence has been given by Martin and his co workers[1 8 148] that 30 per cent of patients with pulmonary tuberculosis show viable and virulent tubercle bacilli in the lower sigmoid and rectum The *Myco tuberculosis* may pass through some imperfection, such as an abrasion or tear in the lining of the mucous membrane or anal skin, and extend by the lymphatics or by other means of invasion, as enumerated under etiology As this organism has a predilection for lymphoid tissue it invades the tunica propria of the mucous membrane and travels by way of the lymph spaces to lodge in the lymphoid tissue of the submucosa Here the disease progresses in an insidious manner Usually, multiplication takes place with the formation of tubercles which coalesce and undergo caseation necrosis If this breaks through the lining of the rectum a characteristic ulcer results The process may extend directly or by way of the lymphatics to the perirectal tissues, especially the ischiorectal fossae, where an abscess is formed, which, upon rupture, leaves a draining fistula At times the process is so intense as to destroy the subcutaneous tissues and sphincters, leaving the perineal skin a distorted mass of ulcerations

The internal opening is usually found at the anorectal line in one of the crypts of Morgagni[13] The aperture is ragged and often larger than in the ordinary type of fistulae[19]

The external opening is usually irregular in outline, while the margins are serrated and undermined with little or no induration Pale and flabby granulations often are present which, upon irritation, are

prone to bleed, whereas the skin surrounding the opening is of a vivid or reddish purple hue One or more external openings may be present, but in either case they are only slightly sensitive to the touch As to the tract itself, it is usually patulous and resulting fistula is frequently complained of by the patient as tender, the discomfort is appreciably less than in fistulae caused by the ordinary pyogenic bacteria Defecation is comparatively associated with usually little discomfort, owing in part to sphinc

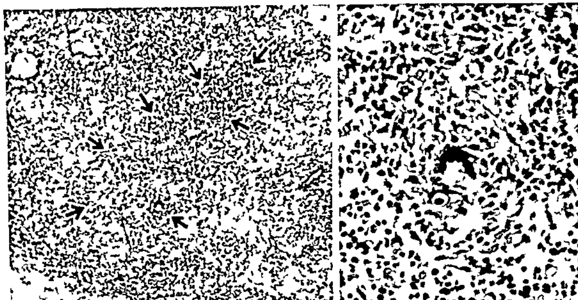


Fig 208 (*Left*) Granulation tis ue from a tuberculous anal fistula In the background of young fibroblasts and capillaries a long ovoid tubercle (indicated by arrows) is seen with a Langhans giant cell on its border (Martin, C L and Sweaney H C Tuberculous anal abscess and fistula criteria for diagnosis Surg Gynec & Obst 71 294)

Fig 209 (*Right*) Same tuberc e as in Figure 208 Giant cell shows peripheral arrangement of nuclei in horsesho formation Epitheloid cells, many lymphocytes and occasional plasma cells and polymorphonuclear leukocytes (Martin C L and Sweaney H C Tuberculous anal abscess and fistula criteria for diagnosis Surg, Gynec & Obst 71 294)

has an ' eaten out appearance The discharge may be small or moderate in amount but is frequently continuous thin and milky The odor is usually offensive due to mixed infection

Symptoms

Tuberculous fistulae if unaccompanied by tuberculosis elsewhere usually present the same symptoms as do ordinary fistulae Those in which tuberculosis is associated offer symptoms which are often almost characteristic of the disease

The onset of the preceding abscess is less acute and the pain less intense The teric relaxation which may be present [7]

The discharge is probably the most frequent symptom referred to by the patient It occurs over a period of time and is more or less continuous but although small in amount it is sufficient to soil the under clothing General symptoms such as fatigue weakness loss of weight, anorexia, late afternoon fever night sweats cough and hemoptysis may be complained of by the patient

Diagnosis

Not infrequently the diagnosis of tuberculous fistulae is difficult The presence of

an associated tuberculosis does not necessarily predicate that the fistula is tuberculous, nor does the existence of a tuberculous fistula absolutely indicate the presence of tuberculosis elsewhere Edwards[9] has called attention to the fact that tuberculous individuals are usually hirsute in this region The history of a chronic fistula preceded by an abscess of insidious onset is only suggestive as to its etiology Occasionally the patient may refer to one or more operations on the same fistula which progressed well to a certain point but finally refused to heal Such a statement is often misleading, because a similar story is given in fistulae of the usual variety Such symptoms as associated cough, loss of weight, weakness, night sweats and fever are reasons to suspect tuberculosis

The *physical signs* presenting a thin, milky discharge emanating from one or more large external openings, these being irregular in outline with serrated and undermined edges and with surrounding skin of a livid or reddish purple hue, and a patulous, moth eaten tract with its internal opening large and ragged, leave little doubt as to the underlying cause Probing is the best means of demonstrating the tract, its course and the internal opening, although some prefer the injection of dyes or Beck's paste This has been discussed under fistula in general The physiognomy and general physique of the individual are important factors to be considered In all cases the patient should be subjected to a careful and thorough physical examination, including tests of the sputum and feces and roentgenographic study of the chest and the gastro intestinal tract

Laboratory This is the only exact means of determining the tuberculous character of a fistula and then only when the investigation is in the hands of pathologists who respect the minutest details and who untiringly examine sections of the tissue serially

Methods of Determining the Tuberculous Character of Fistulae HISTOPATHOLOGIC EXAMINATION According to Sweaney and Martin,[1 3 190] this represents the most exact means of determining the tuberculous character of fistulae and depends on the presence of tuberculous granulation tissue (fibroblasts, lymphocytes, capillaries, fibrin) with the typical horseshoe shaped Langerhans type of giant cell and the characteristic tubercle formation with necrotic center, fibroblastic capsule and monocytic and lymphocytic infiltration In suspicious cases, even though negative, serial section of the tissue is advocated The live granulation tissue that lines the cavity or tract, and not the fibrous wall of the abscess or infected tract, is selected and obtained by scraping with knife or gauze This is then placed in a sterile beaker containing normal salt solution and sent to the laboratory for examination On single section, histopathologic study of tuberculous granulation tissue is positive in 50 per cent of cases, but where serial sections are made at least 75 per cent are positive

BACTERIOLOGIC EXAMINATION *Guinea Pig Inoculation* While this method is more or less routine in the majority of hospitals and warrants confidence as a means of designating the tuberculous nature of clinical material, it would seem subject to two sources of error (A) from tubercle bacilli entering the enteric opening of a nontuberculous fistula resulting in a false positive, and (B) improper sampling giving a false negative Martin[1 1 8] and his co workers have remarked 'Because of the high incidence of tubercle bacilli in the terminal bowel and the consequent probability of tissue contamination, culture and animal inoculation are of very little value in establishing the tubercle bacilli as a cause of anal abscess and fistula, in contrast to the real value of histopathologic examination of tissue" On the basis of painstaking studies, Jackman and Buie[96] concluded that if the guinea pig inoculation is successfully carried out and the result is negative further examination is not necessary to establish the nontuberculous nature of the fistula If the guinea

pig inoculation is positive and histologic examination does not reveal tuberculosis the possibility that contaminated tissue was injected into the guinea pig must be entertained

Martin, Lansford and Sweaney[190] have developed a staining technic in the laboratory of the Chicago Municipal Tuberculosis Sanitorium to meet certain definite requirements necessary in the production of a large volume of routine staining While the methods employed are discussed elsewhere under Tuberculosis, Chapter 14, the results of this method are such that sufficient space should be given to describe their technic in detail

The specimens are secured from each patient with sterile cotton tipped wood applicators inserted through the proctoscope by swabbing the rectal or sigmoidal mucosa previously washed clean by a warm tap water enema

Smears of the swabbed specimens are made on clean slides and stained for acid fast organisms Another swabbed specimen is put into a sterile tube The formula used in staining for acid fast organisms is that devised by Ziehl Neilsen and modified by Cooper The cotton tips containing the specimens are carefully removed from the wooden applicators with sterile forceps and dropped into the tubes in which they are collected Two cc of sterile physiologic saline solutions are added and the mouth of the tubes covered with sterile tin foil

An hour later the specimens are washed from each cotton tip by forcing the saline solution into the cotton tip by the aid of rubber nipples on the end of sterile Pasteur pipettes until the specimens are washed out of the cotton

The saline solutions containing the specimens are transferred to sterile centrifuge tubes the cotton tips being squeezed against the sides of the tubes with the pipettes in order to get as much specimen out as possible

The cotton tips are then washed with 2 cc of 5 per cent oxalic acid in the same manner as with the saline solution and this washing is added to the first washings of saline solution The centrifuge tubes containing the combined washings are covered with tin foil and placed in the incubator at 37 5° C for 20 minutes At the end of this time the tubes are removed and each specimen thoroughly mixed with a Pasteur pipette covered again with the tin foil and centrifuged for 25 minutes at 2300 R P M The supernatant liquid is poured off and 2 5 cc of sterile physiologic saline solution added to the sediment of each specimen and again thoroughly mixed with a Pasteur pipette The purpose of adding the saline solution after pouring off the supernatant liquid is to have a carrier solution containing the centrifuged sediment of the specimen so as to facilitate guinea pig inoculation Approximately 2 cc of the mixed solution is injected into the left inguinal region of a guinea pig The remaining 0 5 cc is cultured for tubercle bacilli The cultures are examined every ten days and the final diagnosis is made at the end of eight weeks The culture medium used is that devised by Loewenstein and modified by Jensen,[9] and later slightly modified by Holmes[93] A medium composed of a mineral salt solution potassium and magnesium sulphate, magnesium citrate, asparagin and glycerine a starch solution (potato starch) egg fluid (both yolks and whites) and a 2 per cent malachite green solution

The guinea pigs are sacrificed at the end of eight weeks and studied grossly for tuberculous lesions and for the enlargement of such glands as adrenals retroperitoneal inguinal, mesenteric and hilar nodes characteristic of a tuberculous infection Any tubercles found in the spleen liver lungs and any purulent material from enlarged inguinal glands at the site of inoculation are smeared and stained for acid fast bacilli

CULTURE See Chapter 14 Tuberculosis

Smears of the material (pus) and discharge have proved unsatisfactory although same may be injected into a guinea pig as above described

ALLIED TESTS *Roentgenogram* Drueck suggests roentgenographic examination of the pelvis in search for calcified lymph glands in cases presenting doubt as to diagnosis although Opie[1] considers calcified nodules of infrequent occurrence

Tuberculin Test The von Pirquet reaction consists of applying a 25 per cent solution of old tuberculin to the slightly scarified arm of the patient by gentle friction If positive for tuberculosis a papule forms in from six to forty hours The test is often valuable in the diagnosis of tuberculosis but does not determine the character of the abscess or fistula As mentioned elsewhere (see

TABLE 9 DIFFERENTIAL DIAGNOSIS

	Tuberculous Fistula	Ordinary Fistula
Occurrence	Hirsute individuals	Not necessarily
Onset	Insidious	Less insidious
Pain	Less intense	Slight or moderate
Discharge	Thin white small amount continuous	Thick yellow moderate or abundant intermittent
Internal opening	Ragged large usually visible palpable	Small often imperceptible
Tract	Patulous and moth eaten Probe easily inserted	More regular tubelike More difficult
External opening	Irregular outline undermined edges adjacent skin livid or reddish purple hue	Round or slitlike Skin normal
Sphincter tone	Often atonic	Normal or tonic
Progress before operation	Characterized by its chronicity Adjacent tissues involved	Intermittent abscess formation Not so marked
Progress following operation	Sluggish—especially in presence of activity in lungs	Heal rapidly
Tissue examination	Histologic or bacteriologic shows tubercle bacilli	Inflammatory tissue
Roentgenogram of pelvis	May show calcified glands	Negative
Associated with	Tuberculosis elsewhere usually pulmonary Night sweats cough hemoptysis loss of weight fatigue and secondary anemia	Not so
Roentgenogram of chest	Pulmonary involvement	Negative

p 427) purified protein derivative (P P D) has been employed in these cases with a greater percentage of correct results than with the older skin tests Sedimentation test similarly may prove the presence of an infection but not its location

Differential Diagnosis Tuberculous fistulae are to be distinguished from those of the ordinary variety These features are shown in Table 9

Sinus formation of the surrounding parts may simulate anorectal fistulae of this variety For example, Magnusson [171] writing from Sweden, reported several cases of osteomyelitis of the ischium with abscess and fistulae (sinuses) in the gluteal region while Boyd [4] cited instances of pus from a psoas abscess rupturing into the pelvis and gluteal region Disease of the vertebra with similar sinus formation from which tuberculous fistulae must be distinguished has been described by Stafford[187] and Makins [1-] Probably the first elaboration of tuberculosis of the coccyx was written by Lannelongue[103] who pointed out the similarity of the condition to primary anorectal disease in its late stages Additional reports are to be found in the literature [51 ?] An interesting case reported in which the true condition was not recognized was cited by A Taylor and the writer [11]

G R, a 42 year old Negro, was seen in the Proctologic Clinic of the Graduate Hospital in May 1937, at which time he complained of a boil" on the right side of the anus He gave a history of having had a low back injury 17 years previously He had had trouble about the anus for 2 months One month previously a boil opened spontaneously on the left buttock A diagnosis of horseshoe fistula was made, and operation at that time consisted of incision of the abscess and excision of a portion of a tract on the other side

Following this procedure the wounds healed and the patient was free of symptoms until the following October, when he again began to have perianal pain, recurring attacks of swelling and discharge of pus from the perineum He was readmitted to the hospital in March 1938 A fistulous tract on the left side was found and excised but no internal opening was demonstrable

In April 1938, the patient was again readmitted because of pain and discharge of pus An incision through the right tract was made up to the muscle and a seton of linen thread was inserted through the internal opening and carried over to the right external opening Two weeks later the patient was readmitted for removal of a fistulous tract Examination showed two lateral open, granulating wounds By this time the course of the disease had

aroused suspicion and the coccyx was x rayed it showed an irregularity in the second coccygeal segment suggestive of a localized osteomyelitis Operation at this time consisted of fistulectomy from the right to the left internal opening

Following this operation the patient continued to have intermittent attacks of perianal pain and almost constant discharge until seen in the clinic in January 1939 General physical examination revealed some changes in the left pulmonary apex suggestive of tuberculosis X ray study showed chronic tuberculous changes in both lung fields with a possible area of activity in the left apex Local examination of the perineum presented a discharging sinus on each side of the anus slightly to the posterior phase and marked deformity of the parts due to extensive scarring There was tenderness on palpation of the coccyx The sinuses could be made to exude a watery fluid on pressure over them A probe when inserted into the tracts passed posteriorly and impinged on bone but no suggestion of extension toward the rectum or anus was noted

The urine was negative on three examinations The sputum was negative for tubercle bacilli on four occasions The red cell count was 4 120 000 and the hemoglobin 11 mg The white cell count was 6 900 The sedimentation rate was 85 mm A Wassermann test was strongly positive a Kahn test moderately positive and an Eagle test slightly positive The blood sugar content was 85 mg per 100 cc the urea nitrogen 9 mg and the van den Bergh 0 2 mg (indirect)

X ray examination of the spine was reported as follows There has been further bone destruction of the coccyx and the lower segment of the sacrum shows demineralization especially on the left It is probably due to an osteomyelitis with bone necrosis "

Operation was performed on January 19 1939 under spinal analgesia employing 60 mg of spinocaine The fistulous openings were explored and found to have no communication with the rectum or anus but to extend directly to the bone With the probe in situ against the bone an elliptical incision was made with the endotherm needle encircling the probe and all tissue down to the coccyx The prevertebral pelvic fascia was freed from the coccyx exposing the retrorectal space and the coccyx was removed The lower sacral segment was trimmed with a rongeur forceps and the roughened surface curetted A small sinus on the right side of the anus was excised curetted and drained after which the entire cavity was packed loosely with iodoform gauze for 24 hours The wound was dressed daily for 3 weeks, and graduated doses of ultraviolet light were administered By March 15 the wound had filled in completely and was almost epithelialized there being an area about 7 cm long and 2 cm wide The patient had gained 14 pounds in weight at this time and his general condition was greatly improved

The pathologic report follows

In the soft tissue there is a fistula lined with granulation tissue Most of the extensive cellular exudate is such as one sees in an ordinary purulent infection but in this case it is due to a mixed infection for a few tubercles exist and in one of these tubercle bacilli are present The bone trabeculae are necrotic The marrow spaces contain much blood marrow cells and many polymorphonuclear leukocytes Diagnosis tuberculous lesion with secondary mixed infection

Prognosis

In brief the prognosis of tuberculous fistulae depends on the local tissue destruction the amount of pulmonary involvement and its activity and the resistance of the individual The prognosis is good in tuberculous fistulae if uncomplicated by tuberculosis elsewhere provided the bodily resistance of the patient is not materially reduced Those in this class with extensive anorectal lesions offer a fairly good prognosis even though protracted provided the vitality has been retained However if tuberculosis is associated the prognosis may be considered as guarded even after intelligent and conservative operative intervention and is directly proportionate to the local and pulmonary involvement and constitutional condition of the patient

Treatment

Palliative Palliative measures are indicated in patients who refuse operation or whose constitutional condition is so impaired that surgical intervention is prohibitive Definitive treatment of the fistula may not be successful however when the pulmonary lesion cannot be brought under control This regime is advisable in ad

vanced cases of pulmonary tuberculosis, where the activity is great, or where there is marked local tissue destruction associated with an active process elsewhere The palliative treatment consists of measures to relieve local discomfort and embodies those procedures which will benefit the general health of the patient Of course, constipation and fecal impaction are to be avoided Liquid petrolatum in sufficient dosage to produce a soft evacuation each day is advocated[161] Frequent cleansing of the parts is essential In some cases, dusting powders such as iodoform, bismuth or thymol iodide may at times be used to advantage Ointments as acetanilid, 1 drachm, to an ounce of petrolatum may prove helpful for perianal irritation Various chemical agents as described on page 181, have been used in an attempt to obliterate the fistulous tract, and though they are not advocated the best of these is probably Beck s paste In all cases the general health of the patient is to be considered in an effort to increase his or her vitality and bodily resistance To this end, the subjective symptoms should be allayed, such as cough, night sweats anorexia and restlessness and, strengthening measures instituted such as systematic rest, fresh air and sunshine, a nourishing diet including plenty of milk and the administration of some reliable tonic as iron and cod liver oil

Surgical Treatment It is generally considered that most tuberculous fistulae may be cured if the physical condition of the patient is good, and the pulmonary lesion brought under control By operation, free drainage is established local pain and discomfort alleviated and, in part, mental and physical depression curbed

Anesthesia General anesthesia especially ether is contraindicated, since pulmonary lesions are aggravated by its use Low spinal transsacral or caudal anesthesia is always the method of choice In dealing with these cases, the author is insistent upon four rules first, that general anesthesia is not employed, second that the tract is incised (fistulotomy) and not excised third, that the division of the tract is performed by the cautery or surgical diathermy, preferably, after which the bleeding points are coagulated and fourth, that confinement of the patient to bed is not protracted

Technic Since conservative surgery is to be desired, fistulotomy as described on page 184 is the procedure of choice The operative area is prepared in the usual manner and the fistula demonstrated by introducing a grooved director into the external secondary opening, through the tract and out the internal primary opening The ends of the grooved director are held taut and the tract is incised in its entirety by means of the cautery, as suggested by Hartman,[8] or the surgical diathermy Such is intended to seal the lymphatics, thereby preventing dissemination of the infection, and to avoid free bleeding All granulation and necrotic tissue is seared, after which the edges are carefully trimmed and the wound is left to granulate from the bottom After all bleeding points are coagulated a small strip of iodoform gauze is lightly placed into the wound for a period of 24 hours

Postoperative Care The usual routine is followed except that the confinement to bed is lessened, since patients do badly if permitted to remain therein over too long a period Hot moist compresses and sitz baths appear to lower the vitality and cause additional loss of weight Therefore, the latter is omitted in this class of cases Local cleansing and the removal of overhanging hairs is a daily procedure and does more to assist healing of the wound than most of the medicaments ordinarily employed Bridging and exuberant granulations are best treated by curettage with dry gauze When the wound is sluggish silver nitrate, 10 to 20 per cent, phenol full strength or lactic acid[198] may be topically applied to be followed in the interim with equal parts of balsam of Peru and castor oil Direct exposure to the sunlight is beneficial Yeomans suggests suberythemal doses of x rays The quartz mercury light has been used successfully by Werner,[70] who considers the period of convalescence considerably decreased by this method T[illegible] are

given every second day at a distance of 30 inches beginning at three minutes and increasing the exposure by one minute at each subsequent treatment Only the wound is exposed to the lamp General considerations as enumerated under palliative treatment including fresh air sunshine wholesome food and supportive tonics should be part of the postoperative regime

Goodwich [8] cites a series of 88 cases of fistula with pulmonary tuberculosis Operation was performed under spinal anesthesia and preferably with the cautery Eighty one were healed four died unhealed The incidence of complete healing was 83 per cent

COLONIC FISTULAE

A colonic fistula is an abnormal communication between the colon and the skin surface or some other hollow organ such as the bladder or small intestine Intestinal fistulae are of two varieties depending on whether the bowel contents discharge on the skin or into another viscus For example an external fistula represents a communication between the sigmoid and the skin of the abdomen an internal fistula represents a tract between the sigmoid and another portion of the large bowel (sigmoidocolic or colocolic), between the sigmoid and small intestine (enterosigmoidal or enterocolic) or between it and the bladder (sigmoidovesical or colovesical) Unusual sites of termination of intestinal fistulae are pleural cavity,[110] vagina [143] uterus [34 5 64 101 1] Fallopian tube spine[100] and perineum [11]

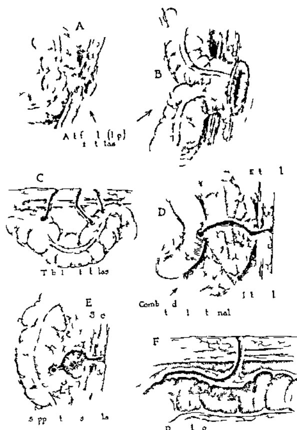


FIG 210 Varieties of fecal fistulas

Etiology The most common cause of intestinal fistula is infection which produces gangrene and perforation of the bowel The causes may be classified as follows (1) congenital (2) operative intentional as an artificial anus (colostomy), or accidental as laceration in separating adhesions compression with forceps ligatures drains packs failure of union after anastomosis (3) pathologic, due to malignancy, diverticulitis regional ileitis, chronic ulcerative colitis, tuberculosis actinomycosis, lymphogranu

loma venereum, (4) traumatic, such as gun shot, shrapnel, perforating and stab wounds, foreign bodies such as enteroliths, (5) post parturient

Symptoms The symptoms of an intestinal fistula depend upon the level of the bowel segment involved The closer the tract in the intestine to the stomach, the greater is the power of the discharges to digest and excoriate the skin and the more profound is the constitutional effect from loss of electrolytes It is for this reason that high jejunal fistulae are dangerous compared to a similar process in the distal colon Usually the patient cites the passage of fecal material and flatus In sigmoido vesical fistulae, the patient may describe the escape of flatus at the time of micturition together with discoloration of the urine which he may not identify as fecal contamination

Diagnosis The external variety of intestional fistula is usually self evident by the discharge of feces and flatus Where the tract assumes a serpentine course between the various layers of the bowel wall there may be absence of both gas and feces A fistula of this type presents itself by continued suppuration from a narrow opening in the skin surface persistence is brought about by reinfection from the bowel Small bowel fistulae are identified by the liquid characteristics of the discharge, and the irritation excoriation and digestion of the skin The administration of indigo carmine methylene blue or charcoal by mouth may be informative A roentgenographic examination following the administration of barium may disclose the tract and its origin while the injection of a radio opaque solution such as *lipiodol* or *diatrast* into the fistula followed by roentgenography may render aid in locating the site of origin, the length and its ramification A fistula associated with induration and purple discoloration of the skin at its mouth is suggestive of actinomycosis In such a communication, the discharge should be examined repeatedly for sulphur granules Where lymphogranuloma venereum tuberculosis or malignancy is suspected, a biopsy should be taken Sigmoidoscopy is often valuable where the fistula is in the pelvic portion of the sigmoid Internal fistulae, as between the large and small bowel, are frequently difficult of diagnosis prior to laparotomy although roentgenoscopy following installation of an opaque solution may be helpful The presence of an obstructing process distal to the point of origin of the fistula must be determined because recurrence will result unless the obstruction is first corrected

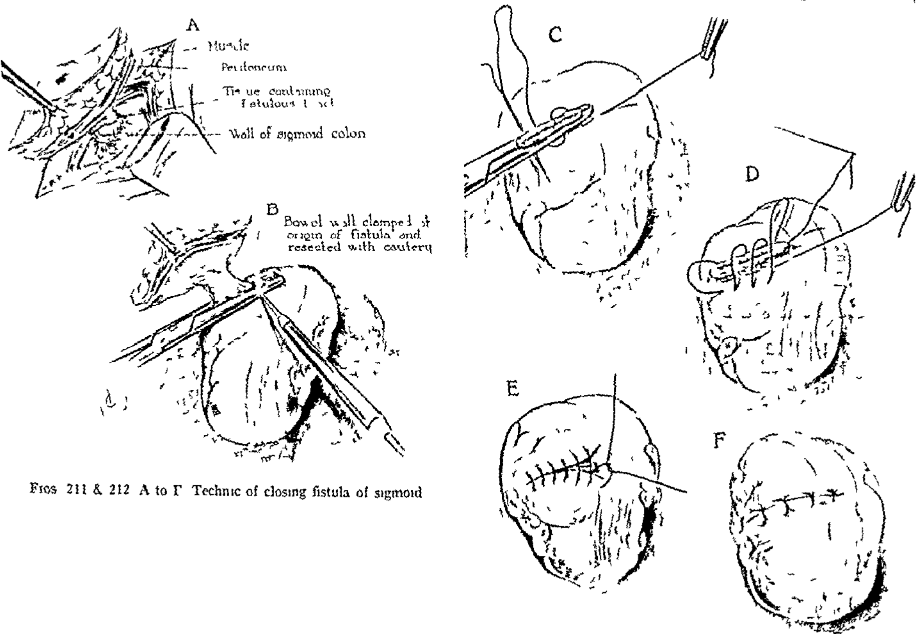
Treatment Spontaneous closure is common where the fistula is single and narrow and no obstructive process exists distal to the opening Ordinarily, the greater the distance between the opening in the bowel and the skin the more likely will spontaneous healing occur By the same token, colonic fistulae proximal to the anus are more prone to heal spontaneously It has been estimated by Dixon and Deuterman[53] that such occurs in from 39 to 88 per cent of the cases On the other hand multiple fistulae and the presence of a spur or mucous lined tract invariably necessitate surgical intervention

It has been often stated that nonoperative measures are permissible so long as the patient shows improvement Many factors however, are to be considered such as the primary condition (ulcerative colitis diverticulitis cancer) the cause for persistence of the fistula, the segment or segments of the bowel involved the characteristics of the tract itself whether external or internal single or multiple and the patency of the bowel distal to the fistula In an exhaustive contribution on this subject Lichtman[111] found that persistence of fecal fistulae was due to (1) an active lesion in the intestinal wall at the fistulous opening preventing spontaneous closure (2) foreign substances such as cotton fiber, lycopodium petrolatum and products of degeneration embedded in the fistulous tract and (3) defective or diseased intestinal wall too large for spontaneous closure

Ordinarily a period of from three weeks to six months or even more of intensive effort is given to permit closure, but such is determined by the amount of

experienced by the patient and his or her general physical condition The management of high intestinal fistulae differs materially from those of the large bowel In the former, it is necessary to neutralize the alkaline secretion and to supply protein upon which the enzymes may act With large bowel fistulae on the other hand digestion of the skin per se is uncommon although small amounts of trypsin may be present The irritation, however, only too frequently causes the patient physical and mental distress, so that meticulous care of the skin around the fistula is essential In this respect frequent change of dressing is helpful exposure to air under a lighted hood is to be chosen rather than an abundance of gauze padding Conservative measures include strapping with adhesive, cauterization of the edges of the opening and simple closure with bone or ivory buttons[51, 1] wood and leather discs Ochsner[1 1] has advocated the injection of iodized oil Preparations commonly used on the skin are aluminum silicate (fuller s earth) and aluminum paint[130] kaolin powder[44] a coating of tincture benzoin sulfathiazole ointment 5 per cent with 1 per cent pontocaine tannic acid 10 per cent, in spray and gentian violet We are especially prone to dress the surrounding integument with cod liver oil alone or in combination with honey[77, 118] Zinc peroxide[208] and white wax have been suggested Salzmann[181] recommends an ointment of 45 per cent cod liver oil and 2 per cent allantoin with 0 5 per cent phenol To avoid the unpleasant odor of rancid cod liver oil Baker and Vonachen[1] substituted a provitamin ointment containing 2 000 units per gram of vitamin A activity in the form of carotene in cocoa butter The beneficial effect of cod liver oil or other vitamin preparations is attributed by most investigators to their vitamin A and D content It has been shown that the administration of vitamin A exerts a protective and regenerative influence on epithelium According to Lauber[106] the vitamin A hastens wound healing only to a moderate degree when given orally but Proto[166] concluded that it is of definite value where applied to the local wound Gauze impregnated with boric acid or petroleum jelly, and wax paper and cellophane may be employed Dietary measures should be directed toward maintaining adequate nourishment and establishing a regular, formed stool A diet as outlined on page 861 may be utilized to advantage Diarrhea may be controlled by preparations such as milk of bismuth, kaopectate and paregoric, or kaomagma Diversion of the contents of the bowel by drains of various shapes sizes and materials is theoretically ideal but in our hands has been seldom practical over a period of time At times we have inserted a small Babcock metal drain into the mouth of the fistula with constant suction Two instances of high sigmoidal fistula occurred following proctosigmoidectomy one for malignancy and the other for diverticulitis In each case a small metal drain of this type designed to fit the opening was prepared by Mr Davies in the machine shop of Temple University Both closed spontaneously In another case however the procedure was discarded for more satisfactory methods Potter[1] suggests placing the patient on a Bradford frame in the prone position to permit drainage into a bedpan or container McCrae and the author employed this method in a boy with a rectovesicoperineal fistula in whom suprapubic drainage had been instituted Occasionally it has been possible to replace the collected secretions through a Miller Abbott tube introduced through the pylorus and past the fistula, through a catheter inserted into the fistulous stoma itself or through an opening established distal to it It must be realized that the loss of large quantities of fluids electrolytes and enzymes result in biochemical disturbances and nutritional deficiencies for which reason replacement is imperative

Patients in whom a trial period of intensive effort has been instituted without benefit are best subjected to surgery The preoperative requirements consume from five to seven days during which time a nonabsorbable sulfonamide preferably sulfathalidine because it is slightly more consti



Figs 211 & 212 A to F Technic of closing fistula of sigmoid

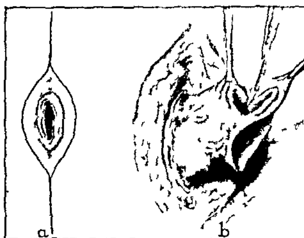
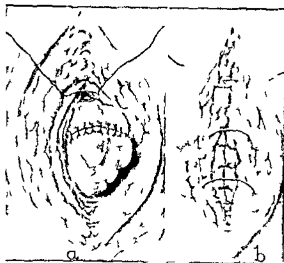
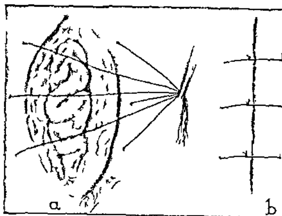


FIG 213 (a) Incision made in the skin through the scar of the original incision made in performance of colostomy The incision is carried around the opening in the bowel, so that a small margin of skin remains (b) Technic of dissection of bowel from the body wall The cuff of scar tissue and skin around the opening in the colon is partially excised

FIG 214 (a) The opening in the colon is closed and the fascial layer is partially closed Complete closure of this layer above the bowel restores the strength of the body wall (b) The fascia is closed completely above the bowel silkworm gut sutures are in place

FIG 215 (a) The iodoform gauze pack is in place holding the skin and subcutaneous tissues open and the ends of the silkworm gut sutures are held in a hemostat (b) Appearance of final closure after the pack has been removed and the silkworm gut sutures have been tied (Pemberton J and Black B M Surg Gynec & Obst 76 387 1943)





pating than the sulfasuxidine is given orally every six hours in suspension form in dosage according to the kilogram body weight A low residue high protein high carbohydrate diet supplemented with essenamine or delcos granules is utilized whole blood and blood plasma are administered as indicated Irrigation of the fistulous tract with physiologic saline solution and a low cleansing enema are given daily

SURGICAL TREATMENT In discussing the surgical approach to this subject a most significant remark was made by C W Mayo[179] which certainly bears repetition

There can be no standard method of operating upon fecal fistulae each case presenting a distinct problem of variable complexity The usual methods of closure are (A) extraperitoneal and (B) intraperitoneal In either case one should be mindful that this must be accomplished through tissues which are infected, and, therefore provision must be made for adequate drainage further, that cure of the fistula depends on closure of the mucous membrane and inversion of the bowel wall over it Another point of utmost importance is preservation of blood supply to that part of the bowel wall to be sutured

A Extraperitoneal Closure An incision is made around the fistulous stoma and carried

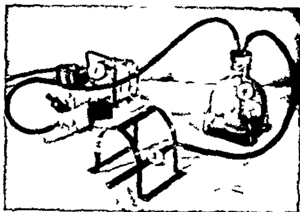


Fig 216 Babcock drainage system (1) Motor (2) Alloy steel hood (3) Perforated alloy steel drain with alloy suction tube attached to tube (4) Glass receptacle

down to the peritoneum which is not opened Radiographs, probes and finger exploration will serve as guides in certain fistulae

The fistulous tract is clamped transversely at the junction with the bowel and burnt off with the actual cautery At this point one must determine if the bowel may be closed by simple inversion The difficulty with closure within the abdominal wall is that fixation of the gut does not always permit an adequate amount of the bowel wall to turn in without tension on the line of suture Here the edges are freshened and the opening closed with a continuous layer of fine catgut which includes the mucous membrane in its bite A second layer of No 35 alloy steel wire is inserted interruptedly turning in the first row of sutures The fascia is approximated with No 32 alloy steel wire although the subcutaneous tissue and skin are closed loosely with drainage Usually sulfathiazole is sprinkled in the wound Coller [9] suggests leaving the fat and skin open for 24 hours with loosely placed far and near through and through sutures that can be tied the following day Pemberton and Black[15c] suggest the method shown in Figures 213 215

B Intraperitoneal Closure Ordinarily this method affords better results but here again one must decide whether sufficient lumen of the gut exists and if suture can be safely carried out without obstructing the bowel The initial steps are not unlike the previous method, although some surgeons, especially Lockhart Mummery [11] advocate a lateral approach through the skin rather than around the stoma In the author s opinion this is governed by the condition of the immediate skin as well as other factors The peritoneum is opened around the fistula and separation from the adherent loops of the bowel begun It may be mentioned that since the contribution by Rankin and Graham in 1937[1 1] on their intraluminal method of closure of colostomy, we have usually employed this technic in our cases of fecal fistulae as well as colostomy Naturally contamination occurs, but the incidence of subsequent infection and recurrence is small Never is tight closure of the fat and skin effected Since 1942 when we first initiated the use of nonabsorbable sulfonamides, our incidence has been even less Providing that sufficient lumen can be preserved the bowel is closed in a fashion similar to the foregoing using two layers of sutures The bowel is replaced in the abdomen, and sulfathiazole is sprinkled over the viscera which are covered by the great omentum A small metal perforated sump drain is introduced into the pelvis and the peritoneum and fascia closed in layers The subcutaneous tissue and skin are approximated loosely with No 32 and 35 alloy steel wire, respectively, with drainage The Babcock sump drain is attached to a motor for 48 hours and is then removed (Fig 216)

In some instances it may be evident that the damaged area is of such dimensions and so situated that closure and inversion cannot be effected without obstruction or that the hyperplasia of the adjacent bowel makes a recovery of the loop uncertain Under these circumstances, resection of the diseased area or a short circuiting procedure is indicated In a few instances we have employed a Mikulicz type of exteriorization procedure and in others, the Rankin technic of obstructive resection In patients with extensive involvement and where the condition of the abdominal skin cannot be improved for early surgical inter

vention, we do not hesitate to perform proximal transverse colostomy as a temporary maneuver

POSTOPERATIVE TREATMENT The care following intra abdominal closure differs but little from our routine for resection (see p 1016 ff) Streptomycin and penicillin are administered routinely The rectal tube and abdominal sump drain are removed on the second or third postoperative day Wangensteen suction is employed for 48 hours and oxygen with carbon dioxide for 24 hours Fluids including whole blood blood plasma glucose and saline as well as amino acids or amigen are administered parenterally during this time A suspension of sulfathalidine is given by mouth in the same manner as before the operation A nonresidue diet is permitted usually on the fourth day At the same time, liquid petrolatum is given night and morning in one half ounce dosage

Incidence of Mortality The mortality rate reported is quite variable—from 8 1[111] to as high as 50 per cent [40] Lichtman and McDonald[111] cite a persistence of the fistula after attempt at repair in 15 7 per cent in a series of 64 cases

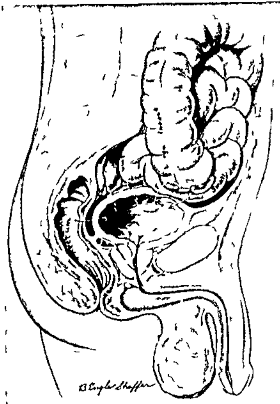


FIG 217 Illustration showing possible routes of fistulous tracts with the bladder (L E McCrea Clinical Cystoscopy, Philadelphia Davis)

COLOVESICAL FISTULA

This variety of fistula should command the interest of colonic as well as urologic surgeons According to Rusche and Bacon [180] 642 cases have been reported since 1870 The condition is more common in males which may be explained as being due to uterine interposition making intercommunication between the intestine and the bladder more difficult from an anatomic standpoint The incidence relative to age is reported as being highest between 50 and 60 [89] There is a paucity of publications dealing with the etiologic factors although in the adult, colovesical fistulae usually result from an inflammatory process as diverticulitis malignancy or injury The occurrence of foreign bodies between the bowel and bladder has been reported [3, 83, 144, 175, 186]

Symptoms The passage of flatus (pneumaturia) during or following micturition is usually the most striking symptom The urine is frequently cloudy and may contain feces and undigested food particles Tenesmus and irritability of the bladder are common in association with the cystitis which develops The escape of urine by rectum is cited occasionally

Diagnosis The prevailing symptoms will leave little doubt as to the diagnosis Sigmoidoscopy cystoscopy, cystography and roentgenologic examination following an opaque enema may disclose the fistulous opening The injection of indigo carmine into the fistula may be detected at the time of cystoscopy For conclusive evidence surgical exploration is often necessary Of left sided colonic lesions a higher incidence is cited due to diverticulitis[14, 100, 103, 109, 189] than malignancy although like Ewell [63] in our group of cases the reverse is true

Cancer of the sigmoid or rectum with fistula to the bladder	23
Diverticulitis with fistula between the sigmoid and the bladder	9

Cancer of the sigmoid with enterocolovesicovaginal fistula	1
Congenital rectovesical 2, and rectoperineovesical 1	3
	36

Tuberculosis as a factor has been reported[1 48 1 3]

Treatment Except for efforts to relieve the accompanying cystitis and to provide proper bowel elimination, the treatment of sigmoidovesical fistula is surgical The establishment of a proximal double barrelled colostomy as close to the fistula as possible is a short circuiting procedure frequently justifiable This is especially true in the presence of inoperable malignancy, diverticulitis associated with abscess formation and severe unrelieved symptoms pertinent to the bladder Irrigation of the lower stoma with potassium permanganate, but preferably sulfathalidine in suspension, may be instituted In performing the colostomy it is important to separate the two loops of bowel to prevent "spill over" of the intestinal contents which would predispose to recurring symptoms While formidable resection offers the best results from a permanent standpoint Our usual plan is to institute a proximal colostomy preferably of the Wangensteen or Devine type, using the transverse colon Following a period of daily irrigation using a suspension of sulfathalidine to permit the inflammatory process to subside resection is performed At the time of the latter especially if intestinal continuity is established, urethral and suprapubic drainage is instituted Intraperitoneal drainage is accomplished with a Babcock sump drain In some instances we have simply resected the diseased segment by an exteriorization procedure, closed the bladder stoma and instituted suprapubic drainage

The disposition of our operative cases is as follows

Operation		No	Deaths
Colostomy alone		10	1
Resection	Cancer	11	2
	Diverticulitis	4	0
Mobilization and Colostomy	Congenital	2	0
		27	3 (Mortality rate 11 1 per cent)

An unusual case of primary multiple malignancy associated with an enterosigmoidovesicovaginal fistula is reported

P G (B 6536) (111589), a white female, age 41, was seen in consultation with Dr J Kolmer in May, 1945 The patient stated that in September, 1943, a sharp pain was experienced in the left lower abdominal quadrant while swimming She was examined and told a tumor was present At operation, a cone shaped mass was found involving the dome of the bladder The abdomen was closed without attempt at removal Biopsy reported spindle cell carcinoma Intensive x ray therapy was administered Subsequently she cited the passage of fecal material per vaginam and hematuria *Intermittent abdominal pain, diarrhea* the passage of feces during urination and loss of weight were described Past and family history were irrelevant Little was learned by examination other than the presence of a collarlike process extending to the upper rectum The sigmoidoscope could not be passed beyond this site The patient was hospitalized and after extensive studies had been made, x ray examination disclosed an enterocolic fistula extending from the middle of the sigmoid to the ileum There was one tract extending from the ileum to the bladder Exploration revealed an extensive carcinomatous process involving the bladder dome, sigmoid and ileum The ileovesical and ileosigmoidal fistula were resected and the abdomen closed An external fistula developed between the sigmoid and the abdominal wall for which an unsuccessful attempt at closure was made Two months later (July 24, 1945), the patient

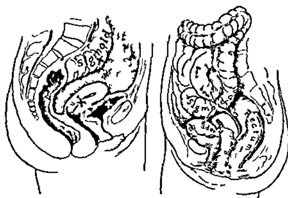


Fig 218 P G age 41 (*Left*) X shows site of three malignant processes (*Right*) Artist's conception of fistulous-tract formations

had gained weight but she was distressed with the sparse drainage of feces and pus from the abdominal fistula On October 18, 1945, under fractional spinal analgesia the abdomen was explored and revealed a normal liver and no palpable nodes By blunt dissection the small intestine was freed and the sigmoid was discovered fixed to the dome of the bladder A probe was inserted through the external opening in the abdomen and was found to communicate with the bladder and the sigmoid The latter was mobilized and exteriorized according to the Mikulicz technic The involved bladder was resected and a suprapubic cystotomy performed Sulfathiazole powder was sprinkled over the viscera and a Babcock sump drain placed in the pelvis The abdomen was closed interruptedly in layers and the exteriorized bowel excised Microscopy revealed 'infiltrating carcinoma of the bowel' On Dec 30 1945, clamps were applied to the spur, and closure was effected on Feb 11 1946

Because of vaginal bleeding the patient was referred to Dr T L Montgomery who recommended a diagnostic D & C Biopsy was reported adenocarcinoma grade III 100 mg 42 hours radium implanted The patient has been re examined by Dr Montgomery at periodic intervals and under date of Sept 1948 he reports "I am pleased to find her feeling so well, and she has no complaints whatever I feel that her pelvic organs are normal at this time and have suggested that she return for re examination in six months

The patient, when last seen by the writer (December 1948) offered no complaints and weighed 151 pounds, compared to her original weight of 117 on first examination At present she is employed as clerk by the American Cancer Society



Fig 219 P G, age 41 Opaque enema study showing enterocolic fistula with tract extending from midsigmoid to ileum

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CHAPTER 8

Pruritus Ani

DEFINITION

Pruritus ani is a syndrome embodying an alteration in the anal and perianal skin due to irritation in the peripheral nerve endings caused by some local or systemic disease. The chief symptom is itching of varying intensity, which is characterized by its chronicity, rebelliousness to treatment and tendency to recurrence.

Synonyms. Anal pruritus, pruritus essentialis, itching about the anus.

NERVE SUPPLY

Anal and Perianal Region. Although the innervation has been described in detail elsewhere (see Chap. 1, Anatomy), it may be well to mention briefly at the beginning of our discussion that the extreme sensitivity of the anal and perianal areas is due to the presence of nerves derived from branches of the dorsal nerve roots of the first, second, third and fourth sacral and the first coccygeal segments (Fig. 46, p. 41.) That these parts are eminently suited to foster the scene for the vicious cycle of itching and scratching because physiologically this region displays the maximum readiness to itch, has been shown[1,7]. According to Longo[89], the only other region possessed of a similar excitability factor is the meatus of the external auditory canal.

OCCURRENCE

Pruritus ani is more common in men than in women, in the ratio of 1.5 to 1,[13] and is most frequent between the twentieth and forty-fifth years. All classes of society are susceptible, but those leading a sedentary life are more prone to be affected.[1] It has been estimated that from 10 to 25 per cent of the adult population are afflicted with one form or another of pruritus ani[4].

Any sincere effort to classify into groups the factors responsible for pruritus ani relegates itself into a complex problem indeed, especially since many causes may present more than one phase. The following may clarify in part or at least serve as a basis:

- Etiology
  - Predisposing Factors
    - Heredity
    - Physiologic
    - Psychic
    - Habits
    - Constitutional
  - Indirect Factors
    - Mechanical or reflex
    - Foods
    - Drugs
  - Direct Factors
    - Infection
      - Parasitic
      - Bacterial
    - Chemical
    - Traumatic
    - Dermatologic

ETIOLOGY—FACTORS

Predisposing Factors

Heredity That heredity is a dominant factor is cited by Hailey,[65] who found recognized manifestations of hypersensitivity in immediate blood relations in 60 per cent of his cases

Physiologic As described under Anatomy (see p 42), the lower third of the anal canal is lined by true skin which is continuous over the perianal region In this area sweat glands, sebaceous glands and hair follicles are present Of the sweat or sudoriparous glands, two varieties are apparent the eccrine or ordinary type and the apocrine The latter are found only where hair exists or has existed and are situated deeply in the dermis They do not function until sexual glandular maturity, and when secretion occurs, there is an apparent granular accumulation near the surface As shown by Richter,[117] these glands lead in secreting cholesterol That they contain more protein and fat than the ordinary eccrine glands has been recognized[84] Their functional activity is increased during the premenstrual cycle and during parturition when hypersecretion and hypertrophy is in evidence Way and Memmesheimer[160] found that the apocrine glands occur with the same frequency and seem equally well developed in both male and female subjects The sudoriparous system or sweat apparatus of the anal and perianal region produces (from the apocrine glands) a secretion of a higher *p*H than do the ordinary eccrine glands Thus it appears rational to assume that an alteration in the physiologic mechanism may serve as a favorable cultural environment and thereby influence the intestinal flora The investigations of Besredka[19] on local immunity or the defense mechanism must be keenly appreciated since this work has been confirmed clinically and by animal experimentation It has been shown that the cells of the reticulo endothelial or histiopoietic system designated macrophages Kupffer s cells or histiocytes, comprise to a great extent the defense and repair mechanism of tissue That these cells are numerous and respond readily to stimuli is evidenced by the studies of Metchnikoff[98] and Maximow[96] It may be postulated that the normal physiologic acidity of the intestinal mucosa depends on this system and upon maintenance of acid base equilibrium By the same token, the response of the system depends in part upon the absorptive and oxidative reducing action of the mucous membrane In this respect Verzar[1 7] cites the ability of the mucous membrane to produce acid secretion through the formation of lactic and hexose phosphoric acids

Psychic Influences Worry fright and overwork predispose to this syndrome At times pruritus ani may be associated with neurasthenia, psychoneurosis and melancholia[47 77 83 116 1 9 138 1 9] According to Drueck[4] the nervous disorder underlying pruritus may range from simple instability to a true psychosis and under the offending functional disorders he groups emotional disturbances and hysteria repressed sexual urge or masturbation, and autosuggestion or heterosuggestion

Habits Chronic alcoholism and a sedentary life such as the continued sitting of the office worker may be cited as additional causes, together with those of constitutional origin

Constitutional Gastro intestinal disturbances gout rheumatism, lues, tuberculosis chronic disease of the liver and gall bladder vasomotor imbalance lithemia[36 1] and uremia may be considered Endocrine factors would include urticaria thyroid dysfunction, hypopituitarism diabetes hypo adrenia[111] and senility[46] Ovarian disturbances have been cited[106 1 4 16] Schafer,[1 1] for example, in a series of 40 cases of severe menopausal pruritus concluded that *estrogenic insufficiency* was important in the etiology Somerford[13?] found an increase or decrease in the blood cholesterol content of 60 per cent of his cases of generalized pruritus

Indirect Factors

Mechanical or Reflex Such conditions may be (1) of the rectum as infection of anal ducts and glands, cryptitis, fissures, fistulae, tumors, strictures, foreign bodies fecal impaction, internal hemorrhoids, papillitis, previous anorectal operations (causing interference with the sensory innervation by scar tissue formation) and the passage of hard stools, (2) of the uterus as displacement, inflammation, pregnancy, tumor and procidentia, (3) of the ovary, as cysts and tumors (4) of the prostate, as hypertrophy, inflammation (reflex) and tumors, as well as seminal vesiculitis (5) of the bladder, as inflammation tumors lithiasis (6) of the urethra, as stricture and phimosis All may, directly or indirectly, cause itching about the anus

Foods *Allergic manifestations, dietary indiscretions, idiosyncrasies, gourmandizing, highly seasoned foods and condiments,"* tomatoes, berries (especially strawberries), shellfish, bran, cheese and nuts may be indirect etiologic factors The term "allergy has been insinuated into the problem of pruritus ani during the past decade Quite properly individual sensitivity to various agents, whether it be food, chemical, infection or drug or a factor such as neurasthenia, does represent an allergic response and therefore must be considered as referred to by Andresen,[7, 8] Martin[94] and others[70–73, 8, 123, 13, 14]

Drugs Certain drugs have been listed as causing pruritus, among which are quinine morphine belladonna, arsenic, copaiba cocaine novocaine and resorcinol An abnormality in the production of or in the reaction of the peripheral nerves to histamine[97, 108] or cholinogenic substances[107] has been suggested as a cause of pruritus

Direct Factors

Infection (1) Bacterial infections of the crypts of Morgagni and especially the anal glands and their ducts, are of importance, as are also (2) infestations of parasitic origin Among the latter should be mentioned pediculi, both corporis and pubis, which may cause pruritus about the anus by extension, tapeworms (*Taenia saginata*), roundworms (*Ascaris lumbricoides*), ring worms (*Trichophytina*), threadworms (*Oxyuris vermicularis*) and scabies

Mycotic infection undoubtedly must be considered a most important etiologic factor, although the writer cannot subscribe to the view that all, or from 90 to 94 per cent as has been reported,[1, 148] is the basis for the pruritic syndrome The cause here is an infection by fungi, usually yeastlike *fungi and Trichophyton like fungi The* former is ordinarily of the genus *Monilia* Two principal varieties of mycotic pruritus ani are distinguishable according to Castellani[32, 33] (1) the trichophytic (epidermophytic), due to the same fungi which cause dhobie itch (epidermophytosis), and (2) the monilial, due to yeastlike fungi of the delicate monoloid type, such as *Monilia candida pinoyi Castellani* and various organisms of the *Crytococcus* or *Torulopsis* type Available evidence by the United States Department of Public Health[114] indicates that pin or threadworms are more prevalent than is generally recognized In a survey of the general population, infestation was found in 35 4 per cent In children an incidence of 31 3 per cent is reported It appears reasonable to the author that, in the case of infection by fungi, which are basically saprophytic, a favorable cultural environment is developed in the alkaline secretion which subsequently incites vasoconstriction, intensifies lymph stasis and *thereby inhibits the protective* mechanism Infection of a bacterial nature, however, causes an inflammatory reaction and produces a cellular response within the invaded tissue and a vasoconstriction with diapedesis of protective elements from the blood stream

Chemical Factors Induction by discharges of anorectal vaginal or urethral origin has been cited in former editions but this subdivision is of such import that various aspects will be discussed

It will be recalled that Hanes[5] in 1925

injected hydrochloric acid on an empiric basis into patients suffering with pruritus ani. Two years later, Davis[40] subscribed to the theory of chemical irritation, basing his remarks on the belief that irritating nonabsorbable chemical compounds are *formed* when certain substances from the bowel are brought into contact with the perianal tissues and deposited there. He rationalized that since foreign compounds *are formed* and *not* absorbed the resultant irritation causes pruritus. Tucker and Hellwig[1 1] *from their histologic studies of the* skin in cases of pruritus ani concluded that *the changes were characteristic of a* chemical dermatitis. A review of the work of Stoeber *and* Wacker[137] *discloses that* cutaneous changes as demonstrated in pruritus ani *can be produced by the injection* of skatole. The role played by skatole and *indole the products of protein putrefaction* and of lactic acid from carbohydrates has *been adequately presented in relation to* the intestinal flora through the experiments of Kendall.[81] Likewise *the interrelationship* of acid base balance to the bacterial flora of *the lower bowel* has been discussed. In 1933, Cannon and McNease[30] concluded *that the pH of the colon was a decisive* factor in the promotion of aciduric flora. More recently, Sokoloff[131] stated that, due to the low absorptive activity of the mucous *membrane the bacterial flora* becomes the decisive factor and the functioning of the colon and its protective acidity depend *to* a large part on the presence of acidophilic flora. In ulcerative processes of the lower bowel this investigator observed a constant disappearance of the aciduric flora with a shift of the contents toward alkalinity. Thus it is evident that any imbalance of a chemical, bacterial or metabolic nature may alter or disturb the intricate physiologic mechanism of tissue structure.

In a noteworthy contribution of recent date, Slocumb[1 8] evaluated disturbances of the acid base balance in a series of 105 cases of pruritus ani. He summarized by stating that the findings were of a chemical irritant alkaline in reaction metabolic in origin and favorable to a correlation of the mucosal *p*H and bacterial flora.

Vitamin *deficiency* both A and B as has been cited[91, 131] is certainly worthy of further evaluation, especially from a scientific standpoint.

Traumatic *Irritations* may *by abrasion* give rise to pruritus such as those due to *hypertrophied* skin tags, condylomata external or prolapsing internal hemorrhoids *ulceration, chafing of skin, diarrheal discharges* coarse clothing rough toilet paper walking rowing horseback riding *pederasty*.

Dermatologic Under this may be mentioned *eczema marginatum*, *dermatitis* venenata scabies intertrigo lichen planus psoriasis and *neurodermatitis*. *Shapiro and* Rothman[180] who are of the opinion that *the cutaneous manifestations in* neurodermatitis are not allergic in nature in spite of *their frequent association with dermal and* mucosal hypersensitivity, have listed their *findings in the accompanying chart*. Neurodermatitis was present in 55.7 per cent of *their* cases *including those with* perianal lichenification.

Contemporary Theories

Murray[10] *stated that all cases of pruritus* ani which he observed were caused by a

The Association of Pruritus Ani with Skin Changes
(Shapiro and Rothman)

	Pruritus Ani without Visible Local Changes		Pruritus Ani with Lichenification Locally		Pruritus Ani with Acute Inflammatory Signs Locally	
	Without associated neurodermatitis	With neurodermatitis elsewhere	Without manifestations of neurodermatitis elsewhere	With neurodermatitis elsewhere	Without neurodermatitis elsewhere	With neurodermatitis elsewhere
No of cases	11	2	12	17	20	8
Per cent	15.7	2.9	17.1	24.3	28.6	11.4

streptococcic infection, of which the *Streptococcus fecalis* was the predominating organism. This was more recently confirmed by Bassler.[1] Allingham,[2] however, insisted that pruritus was due to some pathologic or functional origin. Lockhart Mummery[88] states that a fibrosis of the peripheral nerve endings of the anal and perianal region was the etiologic factor. Pennington[103] was of the opinion that pruritus ani was due to deposits of an inflammatory exudate in

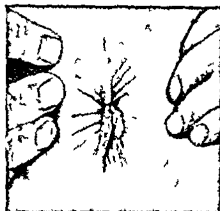


FIG 220 A Pruritic skin showing accentuation of the radiating folds prominence of sulci and pallor of integument

tissues having a lowered degree of vitality, while Jamison[79] suggested that it was caused by channels running beneath the mucosa and perianal skin. Montague[100] was of the belief that if a viscus be chronically irritated certain stimuli were brought about which were transmitted to the central nervous system. To quote "These viscera are supplied by fibers of the autonomic system but these fibers are unable to convey painful stimuli." His deductions, therefore are that these abnormal afferent impulses, by setting up irritation in the posterior spinal ganglion cause stimulation of the somatic afferents with the result that the irritant stimulus is referred to the skin of the pruritic region. Clemons[30] observed the occurrence of pruritus ani with some cases of pyorrhea alveolaris and suggested that the streptococci which found their way into the intestinal flora had their origin in the pyorrheal discharge. Fanz[40] considered the phenomenon a local allergic reaction to split proteins of alimentary or bacterial origin. Agnew[3] indorsed the parasitic theory and based his arguments on the fact that destruction of the parasites causes the symptoms to disappear. Probably the most recent hypothesis is that promulgated by Tucker and Hellwig,[140] who, having demonstrated an abundance of myelinated nerve fibers and tactile nerve corpuscles in the anal papillae, concluded that "irritation of these nerve endings and corpuscles in the anocutaneous line by the inflammatory exudate is the primary cause of pruritus." As reported,[11] we were able to confirm in part the histologic work of these investigators. Specimens stained by Laidlow's[86] and Davenport's[39] technic revealed the presence of an abundance of myelinated nerve fibers in pruritic cases whereas these fibers were sparse in those free of pruritus ani. Tashian,[144, 14] basing his stand on his investigations of the hematopoietic system is of the opinion that the dermatitis of pruritus ani is due to prolonged bacterial invasion or penetration of bacterial toxins into the skin, depleting the normal powers of resistance of the skin.

Smith and the author[130] have been interested in the evidence that a disturbance in the sympathetic nervous system may reduce the threshold to the sensation of itching. Preliminary studies of the skin temperatures of the anal skin in patients with pruritus have indicated that their temperatures were below normal. Such a theory would explain why such a wide variety of treatments have been successful in the past. Any measure which has broken up the so called reflex arc has lowered the threshold to itching. In five patients, who had had intractable pruritus ani for years and who had responded to no form of therapy, immediate relief was obtained by a short series of procaine blocks of the sympathetic ganglia. This aspect of pruritus ani is currently under study.

Credit must be given Archambault[1, 2] of Montreal for his untiring efforts in the study of pruritus ani. This author, who has

achieved excellent results as reported, classifies pruritus into three categories and prescribes treatment

1 Inflammatory—irritative infectious and systemic *Treatment* medical and dermatologic



FIG 220B Case of pruritus ani showing hyperkeratosis

2 Consecutive to anorectal pathology *Treatment* correction of hemorrhoids fissure cryplites prolapse etc

3 Vascular origin *Treatment* removal of skin folds ligation of arterioles

PATHOLOGY

The appearance of the integument depends largely on the cause, duration and degree of inflammation, but nearly always the itching is out of proportion to the local changes In the acute or recent cases the area involved may be limited to one side or confined to a patch or it may be as is usual circumanal The skin about the anal orifice is reddened and glistening and may be either dry or moist The radiating or subcutaneous folds are somewhat smooth and swollen, but the sulci are not deep (Fig 220) In the more advanced or chronic



FIG 221 Pruritus ani Vertical section through anal skin The epidermis is hyperplastic The stratum granulosum is thickened the stratum germinativum is broad and hyperchromatic the interpapillary pegs are elongated The corium shows an increase in fibrous tissue with some hyalinization Other areas of the same section show infiltration with the cells of acute and chronic inflammation

cases the skin has a thickened or leathery appearance due to fibrosis and is pale and blanched in color due to loss of natural pigmentation The normal skin folds or plaits which radiate from the anus like spokes of a wheel are hypertrophied edematous elongated and inelastic The sulci between the folds are sooner or later cracked or fissured, and scattered excoriations due to scratching may be seen, with occasional bleeding Frequently a raw area is visible extending along the anterior or posterior median raphe where the stratified squamous epithelium has been removed It has a white soggy, macerated appearance, with

a clear, moist secretion which not infrequently is foul smelling Ofttimes the area is dry and brittle and cracks easily, small dry flakes of epidermis may occasionally be found pendent On palpation, the skin *is thickened, tough, sensitive to the touch*

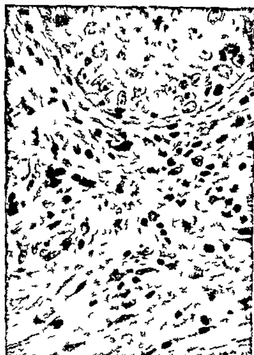


FIG 222 High power section through anal skin, showing infiltration of corium with lymphocytes and plasma cells Loss of the regular arrangement of the cells of the stratum germinativum is noted

HISTOPATHOLOGY

Dilatation of the superficial blood vessels and lymphatics is noted together with perivascular infiltration in the upper part of the cutis Pigmentation is especially increased at the periphery Both inter and *intracellular edema is present Atrophic* changes may be seen in the sebaceous glands with invasion of the walls by the cellular infiltration Hyperkeratosis and thickening of the stratum granulosum were noted in all sections studied, as well as sclerosis fibrosis and fragmentation of the corium (Figs 221, 222)

BACTERIOLOGY

According to the investigations of Hermance[71] and Montague[100] the same organisms present on the pruritic skin are to be found under normal conditions By *culture of sections from the pruritic area,* the latter has isolated from the interior of the tissue the following organisms in order of frequency *B coli communis* and *communior,* gram positive diplococcus and staphylococcus

SYMPTOMS

Itching is the chief and predominating symptom The itching is usually confined to the anal and perianal regions, but may *extend to the skin over the scrotum* or labia The interior and posterior raphe of the perineum, however, is the most frequent site of severe irritation Usually it is of a chronic nature, although occasionally it is acute It may be present to a mild degree or may be so tormenting as to drive the patient to distraction Frequently it is described as a tickling, smarting, biting burning or agonizing sensation with an irresistible desire to scratch the affected area *Tuttle*[1] remarks, "*To the patient it means* agony beside which pain would be a pleasure" The itching may be constant or paroxysmal, with periods of remission An attack, which may last from a few minutes to several hours, is often worse at night, and is so aggravated by the warmth of bed clothing that the patient is rendered inexpressibly wretched by his suffering and consequent inability to sleep Fatigue and persistent irritability ensue, followed by mental exhaustion and physical weakness The pruritus has a tendency to become chronic and frequently is complicated by a *low grade inflammatory process* —traumatic dermatitis—due to the scratching The pruritus coming on at night is due frequently *to some indirect factor,* while that following defecation is almost always from a direct cause Local pruritus associated with generalized body *itching* is of a systemic origin and is classified as indirect

DIAGNOSIS

A history of intractable itching with changes in the anal and perianal skin, such

as erythema, and elongation and hypertrophy of the radiating folds, probably with cracks or fissures will leave little difficulty in diagnosing pruritus ani (Fig 223)

The presence of a sodden epidermis, often circularly arranged around the anus with maceration and desquamation is clinical confirmation of mycotic infection Coexisting dermatophytosis of the feet is not uncommonly associated[74] A positive diagnosis of the *Trichophyton* like fungus can be made only by microscopy and cultural demonstration The material is placed on a glass slide to which is added a drop or two of 20 per cent potassium hydroxide The fungus is distinguished by its irregularly branching septate mycelium Culturally the fungus requires from 10 to 20 days to produce powdery ' colonies which vary in size contour and color

The presence of vesicles and later pustules with a tendency toward coalescence superimposed on erythema with maceration is suggestive of monilial infection The discharge is usually mucoid in character and succulent in appearance A positive diagnosis is made by placing a drop of the mucopus on a glass slide to which is added a drop or two of potassium hydroxide The yeastlike fungus is highly refractile and consists of double contoured yeast cells or branching septate mycelia Culturally *Monilia* grow luxuriantly on Sabouraud s maltose agar[50] in from 24 to 72 hours

The *Oxyuris vermicularis* in its adult form is white in color with tapering tail and measures approximately ¼ inch in length Its presence is not difficult to determine as it may be seen wriggling over the anal skin or rectal mucosa It is well to inspect the crypts by means of a bent probe for the parasite A saline enema may be administered and the rectum contents examined Gabriel[7] suggests a black vulcanite dish for this purpose by which the white worms may be more readily identified For the ova the anal swab consisting of a cellophane tipped applicator in a glass tube as designed by Hall[66] or the cellulose tape swab described by Graham[9] is an improvement over the usual technic From three to seven examinations on different days and preferably in the morning before cleansing or defecation offer the most accurate results The material collected is then placed on a

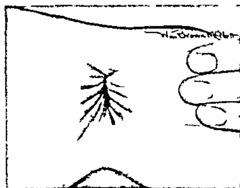


Fig 223 The radiating folds are edematous the sulci deepened

slide in a drop of water saline solution or decinormal sodium hydroxide The ordinary methods of stool examination are of little value in the diagnosis

To determine the *p*H of the rectal mucosa, nitrazine litmus papers are used It is important to employ a neutral lubricant

In all cases a complete examination of the anorectum and sigmoid should be made

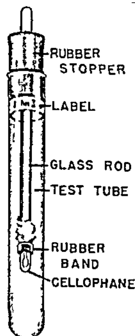


Figure 224

a clear, moist secretion which not infrequently is foul smelling Ofttimes the area is dry and brittle and cracks easily small dry flakes of epidermis may occasionally be found pendent On palpation, the skin is thickened, tough, sensitive to the touch



FIG 222 High power section through anal skin, showing infiltration of corium with lymphocytes and plasma cells Loss of the regular arrangement of the cells of the stratum germinativum is noted

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DIAGNOSIS

A history of intractable itching with changes in the anal and perianal skin such

then repeated For children, ½ grain is prescribed for each year of developmental age The drug is best tolerated when given before meals The four hour enteric coated Enseals are recommended to permit conveyance to the lower ileum before the drug is released Fungous infection of the anoperineum usually responds well to salicylic acid The popular Whitfield s ointment is frequently irritating for which reason Castellani s modification is recommended

℞ phenolis	gr v
acidi salicylici	gr xv xx
acidi benzoici	gr xv xxx
petrolati	qs ℥i
M et ft unguentum	
Sig apply locally	

or

℞ prec sulphur	gr xv xxx
acidi salicylici	gr xv xxx
petrolati	qs ℥i
M et ft unguentum	
Sig apply locally	

Another antimycotic is Deek s ointment (salicylic acid 4 per cent mercuric salicylate 4 per cent bismuth subnitrate 10 per cent oil of eucalyptus 4 per cent in a mixture of equal parts of lanolin and petrolatum) Caskey[31] prescribes an ointment consisting of salicylic acid 1 to 3 per cent sulphur 2 to 5 per cent or iodine oil of cinnamon and thymol each ½ per cent in petrolatum Crude coal tar ½ drachm to 1 ounce is useful or the following

℞ procaine	gr v
ung plumbi	gr ʒi
ung pici	gr ʒi
ung ac salicyl	gr ʒi
ung ac carbol	gr ʒi
petrolati	qs ℥i
M et ft ung	
Sig apply locally	

In the acute stage Holoman employs a spray consisting of

℞ resorcinol	gr v
acidi borici	
sodii hyposulphite	
zinci oxide	aa gr xx
glycerini	M viii
aqua	qs f ℥i

Terrell[148] has used constant wet dressings of red iodide of mercury 1 to 5 000 to give prompt relief

Liquor detergens ½ dram to 1 ounce, has been employed to advantage in chronic cases[9] The following is also of value

℞ iodi	gr xx
potassii iodidi	gr xl
acidi salicylici	gr xlv
acidi borici	ʒiss
alcoholis	℥iii
(50%)	q s fl
M et ft solutio	
Sig apply locally and allow to dry	

For intractable cases, Castellani s carbo fuchsin paint has been found useful (alcoholic solution of basic fuchsin, 10 cc phenol solution 5 per cent, 100 cc filter and add boric acid 1 Gm after 2 hours add acetone 5 cc again after 2 hours add resorcinol, 10 Gm)

Ordinarily our preference is the application of potassium permanganate saturated solution (29 5 grains to an ounce), or gentian violet 2 per cent (9 grains to an ounce) in 20 per cent alcohol Hot sitz baths nightly are prescribed containing 1 drachm of potassium permanganate crystals to which is added ½ ounce of Clorox Frankfeldt recommends an ointment to be applied nightly before retiring as

℞ anesthesin	gr xxx
acidi salicylici	gr iii
aquaphor	℥i
M et ft unguentum	
Sig apply locally	

A prescription containing the following is preferred by Zeigler[170]

℞ acidi salicylici	gr clx
acetone	
ethyl alcohol 85%	
glycerol U S P	aa fl ℥i
M et ft solutio	
Sig apply locally	

Berwick's dye, followed by a superimposed coating of compound tincture of benzoin has been suggested[1,3] Burow s solution diluted with cold water or mercury biniodide, 1 to 5 000 is soothing in the presence of acute inflammation A favorite of the late C F Martin was a solution containing equal parts of phenol menthol and camphor Brown[4] has found

inasmuch as the causative factors in the vast majority of instances are in the region of the anus and rectum or the immediate vicinity Medical consultation is sought in an effort to uncover any remote cause or contributing pathology In this respect, a gynecologic consultation is of utmost value in relation to the *p*H of the vaginal mucosa, the discharge and any unusual organisms In relation to pruritus, the *Trichomonas* is a common offender

SEQUELAE

Anal pruritus may extend to the scrotum, vulvae or sacral skin As a result of itching nervous phenomena and various reflex symptoms may develop ofttimes resulting in generalized physical impairment

TREATMENT

General

Much has been written and suggested for relieving this distressing malady, and while the treatments have often been worrisome and frequently unsatisfactory, all have received some trial, since our chief purpose in following any procedure whatsoever is to allay the distress while attempting to seek the cause Our examination should be thorough and untiring embracing every available means to find some influencing factor Should any anorectal pathology be discovered, it must be corrected Usually where this exists, its cure will result in definite improvement As to the co operation of the patient, it is imperative that he be willing to place himself entirely in the hands of the medical adviser and follow his instructions Cleanliness is essential and may be accomplished by washing the anus and surrounding areas with warm water and castile soap twice daily and after each defecation Absorbent cotton is preferable to any toilet paper now in use Irritation from tight clothing which tends to rub the anal skin should be avoided After inquiry into the general health and habits of the patient possible deleterious factors are eliminated

Importance of the dietary should not be underestimated, not only are certain foods irritating of themselves, but the manner in which even bland foods are prepared and seasoned may render them unsuitable

Excessive eating, the use of condiments and overindulgence in alcohol as well as a superabundance of seasoning are to be avoided Martin[94] advocates a well balanced, high caloric diet supplemented by standard vitamin therapy In this respect, nicotinic acid, 20 mg thrice daily, is recommended by Dabney,[37] while Shannon[106] suggests thiamin chloride in appropriate dosage Subcutaneous injections of histamine have been advocated It has been shown that, following cessation of ovarian function, there is a hyperactivity of the hypophysis that is manifested by an increase in the amount of circulating gonadotropic hormone of the blood and urine and by the same token adequate amounts of estrogenic substances are capable of reducing the hypophysis activity Parenteral estrogenic therapy supported by local inunctions may be employed [1, 8, 11] McCutchan[97] recommends from one half to one milligram of stilbestrol orally each day or in suppository form or estrone, 10 000 international units intramuscularly biweekly

Nervous instability and insomnia may be alleviated by the judicious use of the barbiturates and bromides The opiates are interdicted Bowel function is regulated by proper habits and, when necessary the use of cascara or senna Saline purgatives should be avoided Liquid petrolatum should be omitted because of leakage

Anorectal pathology, such as hemorrhoids, fistulae cryptitis papillitis condylomata, skin tags, proctitis, etc , should be corrected Helminths, such as pin or thread worms (Oxyuris vermicularis), may be destroyed by use of santonin, from 1 to 3 grains or calomel 2 grains, given for three successive nights Our experience coincides with that of Wright and Brady[104] in that gentian violet is superior to other preparations By many it is considered specific The drug is administered orally in from ½ to 1 grain tablets three times daily for a period of eight days, discontinued for a week and

a series of 29 cases, marked relief was obtained in 26

Frankfeldt recommends as much as 150 mg of pyribenzamine thrice daily to protect the receptor cells He observed relief in 77 per cent of his cases within 24 hours Belnap[18] cites 13 per cent relief using 50 mg thrice daily This preparation may be obtained in 2 per cent cream

The studies of Slocumb[1, 5] on the mucosal *p*H and bacterial flora in pruritus ani attracted our attention to the extent that a few cases were treated by the nightly institution of a lactic acid solution by rectum supplemented by hydrochloric acid orally The acid by mouth was tolerated but poorly, and since only two showed very moderate improvement the method was discontinued Early in 1946 however, Dr Lynn Ferguson renewed our interest in the problem whereupon the original investigations of Slocumb were reviewed It will be recalled that in a series of 105 cases Slocumb found the rectal mucosa more highly alkaline than normal as judged by the nitrazine paper test He also observed that the bacterial flora of the rectal mucosa was altered When the excessive alkalinity was corrected by an acid ash diet and local therapy the bacterial flora returned to normal and the pruritus subsided In our department J P Fleming C H Smith M B Holoman and C E Hardwick have evaluated this method in a number of private patients and with slight modification have found it a valuable adjunct in the treatment of pruritus ani Our confreres C J Holley T A Krolicki J C Noss and S A Linde have employed this therapy in their respective cities and are enthusiastic It may be mentioned that in a few instances our patients were referred to a gastro enterologist for gastric analysis all reports of which disclosed an achlorhydria The acid base diet is appended

Acid Ash Diet for Pruritus Ani

Allow *Soups* Milk rice noodle or barley soup meat soups
- *Meat or fish* All kinds two servings daily
- *Vegetables* Corn mushrooms asparagus peas, onions radishes, turnips potatoes may be used sparingly
- *Desserts* Cake, prunes, plums, cranberries, custard rice, tapioca and cornstarch puddings, ice cream Apples and pears may be used sparingly
- *Breads* All kinds, crackers, cookies
- *Cereals* All kinds
- *Beverages* Prune and plum juice, tea, coffee cocoa milk
- *Miscellaneous* Butter cream cheese jam mayonnaise eggs rice, noodles, barley

Restrict All fruit and vegetables not listed above

Sample Menu

Breakfast
- Prunes
- Oatmeal—cream
- 2 eggs
- Whole wheat toast, butter
- Coffee

Dinner
- Beef bouillon
- Roast lamb large serving
- Buttered rice
- Asparagus tips
- Whole wheat bread, butter
- Bread pudding
- Tea

Supper
- Chicken broth
- Beef patty
- Stewed corn
- Whole wheat bread butter
- Plums
- Milk

In addition a capsule of glutasin (glutamic hydrochloride gr v pepsin gr ¼) is given before each meal and at bedtime and a gelatin suppository containing beta lactose 20 grains is inserted into the rectum upon retiring

As recently reported by C E Hardwick and the author[14] the results of this regimen are tabulated in the accompanying table

Results in Treatment of 125 Cases of Pruritus Ani

	Cases
Symptom free—3 months or more	84
Showing improvement—3 months or more	37
Not improved	4
Showing recurrence during treatment (usual reason not following instructions)	21
Showing allergic manifestations and treated	11
In which fungi were demonstrated	16
Showing parasites—usually pinworms	4

the following a satisfactory ointment but cautions that a dry skin is necessary before application

℞ phenolis	gr xx
camphorae	*gr* xiii ss
benzocaine	gr ½
zinci oxidi	gr clxiv
petrolati	qs ℥i
M et ft unguentum	
Sig apply locally	

The appended is also of use

℞ iodi	gr xx
potassii iodidi	gr xl
acidi salicylici	gr xlv
acidi borici	℥i ss
alcoholis (50%)	q s fl ℥iii
M et ft solutio	
Sig apply locally and allow to dry	

Desensitization with serial dilutions of monilial extracts is a satisfactory method according to Fowle [9] Where fungi have been demonstrated Terrell recommends the administration of potassium iodide saturated solution beginning with 20 drops thrice daily and increasing by 1 drop until the symptoms of iodism appear Thereafter the dosage is decreased slightly and continued for several weeks Many patients improve upon reaching the saturation point and remain symptomatically free for varying periods of time In mild pruritus the following may be used

℞ phenolis	gr x
lotio calaminae	q s fl ℥iii
Sig apply locally	

or

℞ acetanilidi	ʒi
petrolati	q s ℥i
M et ft unguentum	
Sig apply locally	

or

℞ *sodii thiosulphatis*	℥i
phenolis liquefacti	℥ss
glycerini	℥i
aqua distillata	q s ad ℥vi
Sig apply locally	

In some instances citrine ointment [2] or chloroform ointment [6] will allay the itching when other methods fail It should be removed at the end of 24 hours and replaced by resorcinol salve

If the surfaces are weeping and moist, Lassar's paste (zinc oxide starch aa ℥ii paraffin ℥i) or tincture iodine, 1 to 10 is very useful Dusting powder, such as zinc stearate or calomel, may be employed or the following, as recommended by Hibshman

℞ dithymol diiodidi	ʒi
bismuthi subcarbonatis	℥iii
M et ft pulv	

The skin should be washed with warm water and castile soap and dried before the powder is applied

If the skin is thick and leathery, mercury, or phenol, *1 to 5 per cent in lotion* or ointment form, or silver nitrate, 1 to 15 per cent, is stimulating Potassium permanganate, saturated solution (29 5 grains in 1 ounce water, 25° C) may be painted over surface daily Liquor potassae,[1 6] solution of mercuric chloride, [1] or a 10 per cent nitrate of mercury ointment[1] has proved of value If the skin is acutely inflamed, calomel and lime water may be applied

℞ calomel	gr xvi
liquor calcis	q s ℥iv

Cracks fissures and excoriations may be treated by topical applications, using a glass rod or stick, of (1) phenol, 90 per cent solution neutralized by tincture benzoin, (2) silver nitrate 10 to 20 per cent solution or stick, neutralized by tincture iodine and (3) pure ichthyol or the following

℞ phenolis	gr xx
acidi salicylici	ʒi
camphorae	gr v
glycerini	q s fl ℥i
M et ft solutio	
Sig apply locally	

Following the use of this prescription when excoriations are healed tincture benzoin may be applied or the following

℞ balsami peruviani	
olei ricini	aa fl ℥i

Aldrich[4] has recommended a 70 per cent cod liver oil ointment as an adjunct in the treatment of pruritus ani A gelatin capsule containing 2 5 Gm of the ointment is inserted into the rectum after each stool In

elapsed since our rather terse remarks regarding the use of alcohol in cases of pruritus ani The incidence of pain and occurrence of slough in our small group of 13 patients caused considerable concern, and resort was made to more conservative measures A renewed interest, however, became manifest so that the intervening period has permitted further evaluation in a series of more than 300 patients treated with varying strengths of alcohol Experience has shown that patients are better hospitalized for a few days that regional analgesia, such as caudal or transsacral, is preferable, and that sloughing should be considered a sequela rather than a complication Detailed records have not been kept of these patients although it may be stated that, in a moderate number permanent improvement was effected while in the majority, the relief of symptoms was pronounced Our technic may be described in the following manner The patient is hospitalized and prepared in the customary fashion as for any anorectal operation Using sacrocaudal analgesia, a 20 gauge needle, 10 cm in length is inserted through the antisepticized perianal skin at its lateral aspect and just outside the area of cutaneous involvement After the needle to which is attached a 20 cc syringe containing 10 cc of absolute alcohol with an equal quantity of physiologic saline solution is inserted beneath the skin the contents are slowly distributed until one entire half has been injected The needle is withdrawn and the opposite side treated in a similar fashion The injection should be made beneath the skin (subcutaneously) Injections should not be made into the skin nor in the anal sphincter further they should not be permitted to pool Satisfactory results have been reported by others[133, 136, 143, 163]

Hydrochloric Acid An indorser of the theory of chemical irritation Hanes[67] believed that hydrochloric acid either destroys the organism if it be a bacterium or makes its environment uninhabitable or that it causes an influx of blood to the diseased tissues While the writer does not favor the technical factors involved here, the rationale is most plausible in view of our present concept regarding tissue chemistry It may be possible that a correlation does exist between the acid base balance of tissue and the intestinal flora

Because of its relative popularity and the good results obtained the method as originally outlined is described

Technic A needle, 20 gauge and 3 inches in length is introduced through the skin in the posterior median line 1 inch from the anus and slowly advanced to the right of the anal margin well under the cutaneous surface A 20 cc syringe is attached and 20 cc of novocaine 0 5 per cent are injected, the needle being allowed to remain in situ (Six to 8 cc of nupercaine solution, 1 1 000, may be introduced into the same field) This is followed by the injection of from 10 to 15 cc of 1 3,000 hydrochloric acid Care should be taken that the needle remains in situ until the injection is completed, after which the left side is similarly treated The nupercaine may be used to maintain the analgesia Deep massage and manipulation of the parts injected should be freely practiced immediately after the injection and two or three times a day until the soreness is entirely relieved The massaging not only distributes the fluid and prevents breaking down of the tissues but causes an influx of blood which is beneficial to them[68]

Comment In our own cases we have at times used hydrochloric acid with benefit but this is also true of most of the other solutions generally employed In other words there is no one solution which, on injection will invariably give equal results in every case The most we can do is to evaluate each medicament by judicious use and careful observation supplementing our own studies by noting the reports of others

Benacol Yeomans[165] advocates the use of benacol a nontoxic anesthetic moderately antiseptic preparation which appears to have a mild depressant action on the peripheral nerve endings His reports[167, 168] are most encouraging (90 per

INJECTION METHODS

Alcohol As is well known, alcohol possesses a destructive effect on nerve structures and for this reason has been employed in the treatment of pruritus ani More than two decades ago Stone[141] advocated the subcutaneous injection of 95 per cent grain alcohol to destroy the terminal sensory filaments that supply the diseased area In brief, his technic consists of placing the patient under a general anesthetic and injecting from 2 to 4 drops of the alcohol into the subcutaneous tissue at each puncture, the punctures being placed about ¼ inch apart over the entire area involved Stone[140] summarized his experiences by stating, "It is not as a rule permanent in its results it is by far the best treatment with which the writer is familiar"

Buie describes a method which is intended not only to destroy the peripheral sensory nerve filaments but to prevent their regeneration The results obtained were more than encouraging in 84 per cent, permanent freedom from symptoms was effected in 8 per cent, sufficient comfort was experienced to permit patients to resume their daily chores in 5 per cent, there was little relief and in 3 per cent, complete failure

TECHNIC The patient is hospitalized and prepared as for a hemorrhoidectomy Transsacral analgesia is used A 20 gauge needle 10 cm in length is inserted through the perianal skin at a point posterior to the anus and just outside the area of cutaneous involvement The needle to which is attached a syringe containing 40 per cent ethyl alcohol is passed along the side of the anus and beneath the skin until the anterior margin of the anus is reached As the needle is now withdrawn slowly the alcohol is discharged so as to distend the skin uniformly without undue tension The opposite side is treated in a similar fashion Ordinarily 20 cc of alcohol are injected although 35 and even 40 cc have been employed He cautions against injections to such a depth as to involve the anal sphincters, and states that, if the alcohol is injected intradermally or if too much infiltrates any one area, slough will ensue Although slough occurs in 50 per cent of cases, he does not consider it undesirable if it can be controlled, since no degree of permanent incapacity has resulted The after treatment consists of from two to three weeks in the hospital and from four to eight weeks' daily observation from the time of operation

COMMENT The excellent results obtained in this series are certainly encouraging Except for the high percentage of sloughs encountered, the only objection that could be offered is the prolonged period of hospitalization The author has had no experience with this precise technic.

Haskell and Smith[69] have modified this technic into an ambulant procedure In a series of 22 cases they report complete relief of symptoms in 16 for a period of a year or more

TECHNIC With the patient in the Sims position the perianal skin is prepared as for any anorectal operation and one fourth or one fifth of the region is selected for the treatment A small wheal is raised by the injection of procaine just beyond the outer edge of the involved skin A 20-gauge needle, from 2 to 3 inches long, is inserted through the wheal and advanced under the skin Two cc of a 2 per cent procaine solution are injected subcutaneously In addition from 3 to 5 cc of the solution are injected in a fan shaped manner from the border of the normal skin to the mucocutaneous margin A syringe containing an equal amount of 70 per cent ethyl alcohol is attached and the solution injected by moving the needle back and forth so as to distend the skin uniformly The procedure is repeated at intervals of from four to seven days until the entire perianal skin has been treated From four to six treatments are usually required, or a total of from 15 to 20 cc of alcohol In the interim a mild antiseptic dressing is applied and the patient is advised to use hot saline compresses for several days

COMMENT Nearly nine years have

cent, benzyl alcohol 10 per cent, and phenol 1 per cent in 5 cc of sterilized almond oil The technic employed is precisely the same as that outlined, namely, 5 cc in each posterior quadrant and a week later 5 cc in each anterior quadrant All injections are given subcutaneously

COMMENT Over a period of approximately nine years several hundred injections have been given It is probably the most flexible method to be employed Nupercaine in oil is our choice for office use The injections are not attended by pain, and the reactions, in our experience, have been nil Relief of symptoms for varying periods of time is usual Instances of permanent improvement were seldom encountered Lieberman[57] noted relief of itching for a period of six months or longer in 28 of 30 cases injected An incidence of 40 per cent cure has been reported by Frankfeldt [23]

Quinine and Urea Hydrochloride Because quinine and urea hydrochloride in certain strength solution is capable of producing prolonged analgesia when injected locally it has been employed in the treatment of pruritus ani [64] According to Ground [61] a fibrosis of the corium occurs which decreases the blood supply to the papillary layer thereby interrupting the sensory innervation

HIRSCHMAN S TECHNIC [75] The site selected for the puncture, in either the anterior or posterior commissure is sterilized and a needle to which is attached a syringe containing equal parts of novocaine and quinine urea hydrochloride each ½ of 1 per cent is introduced The solution is injected slowly beneath the skin until the entire pruritic zone has become slightly elevated From 20 to 40 cc of the solution may be required the treatment to be repeated at intervals of from 5 to 7 days if the itching returns Scarborough[1 0] considers this the solution of choice His technic is as follows From 10 to 20 cc of a 1 per cent solution of procaine are injected subcutaneously on one side of the anus after which 30 cc of a ⅓ per cent solution of quinine and urea hydrochloride are introduced into the same site Only one aspect of the anus is treated at a sitting

Distilled Water Although Hanes[6] employed sterile water in treating a few cases of pruritus ani in 1928, Davis[40] was the first to study and report on a substantial series This investigator believed that the distilled water dilutes and aids in the absorption and excretion of chemicals which he thought accumulate in the anal and perianal skin causing pruritus Tashian,[144] on the other hand holds that triple distilled water stimulates the defense cells of the reticulo endothelial or histiocytic system Broadly speaking Davis[41] was most successful in his cases so far and as he stated not one in a series of 200 could be called a failure

TECHNIC The patient is placed in the exaggerated left lateral position and the quadrant causing the most distress or the one appearing most angry is selected for the first injection A point just beyond the periphery of the pruritic zone is touched with tincture of iodine and wiped off with alcohol When this has dried, an intradermal wheal is raised with a few minims of the procaine solution in a small hypodermic A 21 gauge needle 2½ inches in length to which is attached a syringe containing 1 cc of procaine hydrochloride is inserted through the center of the wheal and advanced slowly beneath the pruritic skin (Fig 226) Midway between the outer margin of the pruritic area and the anal verge the procaine is deposited if discomfort attends the passage of the needle a few drops of the analgesic solution may be injected during its introduction The proximal end of the needle is held with a hemostat to keep it from moving and the empty syringe detached After a lapse of three minutes a syringe containing 10 cc of triple distilled water is attached and the contents are injected slowly If there is any pain or other discomfort the injection is suspended for a few seconds Each quadrant is similarly treated at biweekly intervals until a series of 8 injections have been given or until the patient is symptom free

cent cure) Others[9, 1] mention its persistent and prolonged analgesic effect The solution consists of 5 parts each of para amino benzoyl (ethacaine) and phenmethylol in 90 parts of rectified, sweet almond oil

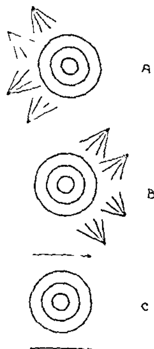


Fig 225 Gabriel's technic (A) Injection is made in the posterior aspect of the perianal region through four punctures in a fan shaped manner (B) The anterior portion is treated in a similar fashion (C) The solution is injected laterally

Technic After the skin has been prepared with tincture of iodine a dry 5 cc syringe armed with a 22 gauge needle 3 cm in length is filled with 3 cc of the warm benacol solution, which is injected subcutaneously into the quadrant causing the most distress This injection is begun at the periphery of the pruritic area and slowly distributed in a fan shape to the anal verge Similar treatments are given at intervals of two or three days until all the quadrants have been injected If necessary, the course may be repeated at intervals of two weeks until the itching is entirely relieved No anesthesia is required

Anucaine As proposed by Gorsch[58] this preparation consists of 5 parts each of benzocaine and phenmethylol, 1 part of butyl aminobenzoate, and ⅛ part of novocaine base in sweet almond oil The technic is similar to that employed with benacol except that 2 5 cc of this oil soluble analgesic are injected into the cellular tissue through each of four punctures, two located laterally and two posteriorly to the anus One week after the treatment each anterior quadrant is injected in a similar fashion with 2 5 cc of this solution

A B A Solution This, developed by Gabriel[9] as an inexpensive substitute for benacol, is another popular preparation It is composed of anesthesin, 3 per cent, benzyl alcohol, 5 per cent and ether, 10 per cent, in sterilized oil The solution is injected subcutaneously in a fan shaped manner In a series of 70 cases this author estimates the results as good in 46, or 65 7 per cent, of the cases

Technic The patient is placed in the left lateral position and the perianal skin rendered as aseptic as possible At the first treatment 10 cc are injected into the posterior half of the perianal region through 4 punctures 2½ cc being injected subcutaneously at each point, as in Figure 225A A week later 5 cc of the solution are injected through each of 2 punctures into the right anterior anal quadrant The left anterior anal quadrant is similarly treated (Fig 225B) The following week or two weeks after the initial injection, 5 cc of the solution are injected subcutaneously on each side of the anus (see Fig 225C) In this way a total of 30 cc is administered No anesthetic is required

Comment At a former date our experience with A B A solution in a group of 50 patients was cited Inasmuch as we have utilized other preparations this series is too small for comment Suffice it to say that my colleagues employ it to their satisfaction for which reason the solution may be recommended in the treatment of pruritus ani

Nupercaine in Oil Also developed by Gabriel, this is a substitute for A B A solution and is composed of nupercaine 5 per

of rubber tube and a 19 to 22 gauge hypodermic needle two inches in length The technic is described as follows Without anesthesia, the perianal skin is aseptically prepared and the sterile needle inserted into the subcutaneous plane The needle, which is now attached to the rubber hose is inserted into the posterior commissure, first on one side and then on the other The oxygen is slowly injected, the absorptive power of which is given as 180 cc per minute On an average three minutes is consumed for each side From three to six injections at three day intervals are usually given Rapid movement of the oxygen to distant parts may be prevented by maintenance of pressure with the finger

Vaccine Therapy

Strange it is how the work of an investigator is so enthusiastically offered, and for that matter often accepted only to be laid aside and then after a period of years brought to light again It is because of a recent revival of interest in the use of autogenous vaccines that the labors of Murray are here reviewed A little over twenty years ago Dwight Murray[103] isolated the streptococcus especially the fecalis strain, from the anal and perianal skin of patients suffering from pruritus Because of his percentage of cures subsequently published he concluded that the use of autogenous vaccines in these cases had been of value He also deduced that all cases of true pruritus ani were caused by or associated with one of the streptococci group[101, 10, 104, 10] Considering the facilities at hand his investigation was exhaustive but unfortunately was not substantiated by many other interested workers

Quite recently Bassler and Connors[17] reported their findings over a period of twenty years These appear to be strictly scientific and for that reason, deserve more than cursory mention Their modification of the original technic is described in detail

Technic The anal skin is bathed with a 1 per cent sodium bicarbonate solution to inhibit the growth of the streptococci that may be free on the skin surface, and then washed off with physiologic salt solution The parts are dried, a small swab is placed in the deepest folds and the skin rubbed vigorously until it is practically broken through Implants are made on solid hormone agar or agar plates by gently stroking the surface The *Streptococcus faecalis* which apparently is the most important, occurs as small colorless beads not unlike granules of fine sand Three cultures are made, the streptococcus and the staphylococcus on hormone media and the *B coli* on blood agar After incubation, the specimens are stained by Gram s technic and examined morphologically When secured the streptococcus is inoculated on six blood agar or hormone slants and incubated for a period of several days or until a thick growth is obtained This is washed off with physiologic saline solution and transferred to a sterile vaccine bottle containing a few glass beads which is filled with 1 5 000 merthiolate solution The bottle is shaken occasionally for two days to break up the bacterial clumps and the concentrated vaccine thus prepared is ready for use Initially one minim is injected intradermally or subcutaneously and increased by one minim at each subsequent treatment This injection is given at biweekly intervals for one month, or until local reaction is obtained If improvement is not marked with the streptococcus vaccines are prepared from the discarded cultures one containing the staphylococcus and the other *B coli* forming a mixed or attenuated vaccine This is then employed

Their findings are based on a series of 121 cases of true pruritus ani of which the records are complete in 98 Of this number, all reported a complete cessation of itching for at least three years after completion of the treatment

Local Immunization

The hypothesis of Besredka[19] as applied to the pruritic syndrome entails the taking of cultures from the anal and perianal region of patients suffering from pruritus

COMMENT As reported by the author in 1934[13] and again in 1936,[10] the use of distilled water in the treatment of this distressing syndrome has been of value in a fair percentage of cases In a series of 133 cases,

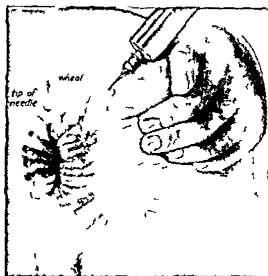


FIG 226 Method of subcutaneous injection A wheal has been made beyond the outer margin of the pruritic zone Through the wheal a needle of larger caliber is advanced immediately beneath the skin where the solution is deposited (From author s article in Cyclopedia of Medicine Vol 10, G M Piersol, ed, Philadelphia, Davis)

41 did not return for checkup or did not reply to our questionnaire Thirty nine of this 41 however, were symptom free or improved when last seen In three the treatment was interrupted because of the development of an ischiorectal abscess incident to the injection This we attribute to improper cleansing of the skin no such occurrences have taken place since greater care has been exercised The reports on the remaining 88 cases representing a lapse of from 24 to 36 months are as follows

Symptom free (cured)	27 or	30 7%
Improved	56 or	63 6%
No relief	4 or	4 6%
Worse	1 or	1 1%
	88	100%

Mejia[11] recently cited an experience with relief in 70 per cent of his cases

Magnesium **Sulphate** In order to reestablish biochemical equilibrium, Sermenini[1 1] advocates the epidural injection of magnesium sulphate

TECHNIC Two cc of a 1 per cent solution of procaine are injected into the epidural sac using a lumbar puncture needle A syringe containing a freshly prepared 20 per cent solution of magnesium sulphate is attached to the needle and from 5 to 6 cc are injected The patient remains in a recumbent position on the table thereafter for 15 minutes Administered every three days, a total of from three to six injections are usually required Of 51 intractable cases positive results were obtained in 46 No untoward symptoms were experienced except transient headache and backache Other reports have been cited[38 1 s]

Eucupine Eucupine or iso amyl hydrocupreine, is a quinoline derivative and, according to Dixon and Premankur,[43] its anesthetic effect is twenty times that of cocaine Manheim and Marks[9] are enthusiastic about this preparation and observed that, in the cases closely followed, there was no evidence of delayed healing

TECHNIC The skin at each site of injection is anesthetized with procaine—anterior, posterior and two lateral quadrants From three to five cc of the warmed oily mixture (composed of eucupine base 0 1 per cent ethylaminobenzoate 3 0 per cent, benzyl alcohol 5 0 per cent in expressed oil of almond) are distributed in a fanwise fashion beneath the skin through each of the anesthetized area A total of from 15 to 20 cc of the solution is used after which the parts are massaged to prevent pooling

Oxygen To correct tissue anoxia, Guess[6 63] advocates the use of subcutaneous injections of oxygen for the relief of itching In a preliminary report,[6] 80 per cent of his cases due to trichophytosis, irritating substances and hyperkeratosis were cured and relief was afforded in the others The procedure is painless, requires little time, and may be administered with safety according to the published articles The apparatus consists of one small tank of oxygen a reducing valve a bottle of water through which the oxygen flows, four feet

lized petrolatum or lanolin to hold the dye A thick creamy paste is made by mixing a small quantity of the mercuric sulfide powder (cinnabar) with sterile water The end of the tubular sheath of the tattooing machine sterilized by boiling or formaldehyde vapor is dipped into the paste The sheath is placed at an angle of 40 to the skin the skin being held taut to obliterate the folds An area one centimeter long is tattooed with a slow steady back forward or rotary motion which is repeated until the skin is uniformly stained red The skin of the anal canal is treated first proceeding from the anal verge to the anorectal line Then the perianal skin is tattooed radially from the anal orifice All involved skin must be tattooed Skipping is avoided by frequent sponging The treated area is covered with phenolized petrolatum From 45 to 60 minutes is usually required Edema and tenderness may occur and persist for 48 hours Anesthetic ointments relieve the associated distress Desquamation occurs in a *few days leaving* the mercuric sulfide deposited in the corium

COMMENT *Cantor has recommended the* combination of subcutaneous neurotomy and tattooing which suggestion indicated to Shapiro and Rothman[1] that tattooing *is not a satisfactory* procedure *Turell* has reported poor results in patients who have had excessive roentgen therapy Unfortunately the results from a large group of cases are not available The enthusiasm of these various workers appears to have tempered in recent reports In a recent communication to the author Turell states that, in a series of 70 patients 55 recalcitrant cases responded to tattooing while the remaining 15 obtained satisfactory results In a group of 23 patients without cutaneous changes but with intractable symptoms of itching six obtained satisfactory results while 17 failed to improve Our own experience is very limited approximately 20 patients being treated by this method in private practice and in the clinic Uniform distribution of the pigment was not obtained "skipped areas were prominent and itching was not materially relieved There is evidently an art in holding

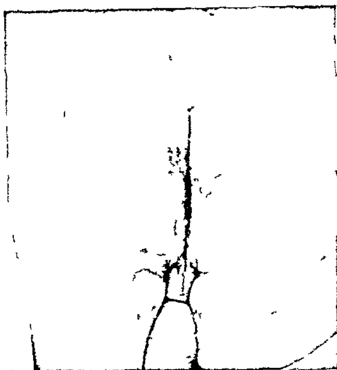


FIG 227 Exfoliative dermatitis of anal area and buttocks

The debris or scrapings before and after sterilization are planted in hormone broth and incubated at 37 5° for 72 hours After identification of the organisms, the culture is passed through the Berkefeld filter and the antigen completed by the addition of 3 drops of tricresol, 0 1 per cent solution, as a preservative The prepared autogenous vaccine is injected intradermally and subcutaneously into the pruritic area after cleansing of the surface with alcohol Initially, $\frac{1}{10}$ of 1 cc is introduced and the dose gradually increased until 1 cc is given Injections are given every third day From two to four areas are treated at each sitting We instituted this treatment a few years ago and as previously reported,[1] employed it in a series of 21 cases Of this number, seven were clinically cured nine showed some improvement, three presented no change and two were subjectively and objectively worse The number of injections ranged between five and 16 with an average of eight Of a total of 68 cases 52 or 76 4 per cent, showed definite improvement

Nutrient Broth On the theoretical basis that nutrient broth stimulates the reticulo endothelial or histiocytic system by mobilizing the cells [161] Tashian[144] advocated the injection of a sterile solution consisting of meat extract 3 Gm , peptone 10 Gm and sodium chloride 8 Gm *adjusted to pH 7 2* in cases of pruritus He believes it to be the most innocuous and efficient mode of treatment and mentions that a cure was effected in every case In a later article [14] this worker reports that 86 per cent of the cases were perfectly well in a series of 150

Technic The pruritic skin is cleansed with ether and alcohol and painted with tincture of iodine With a fine needle 1½ inches long, the sterile solution is injected from the periphery toward the orifice of the anus, fanwise dividing the circle in six portions *5 cc being given at each injection* or a total of 30 cc This is given at the one sitting In addition 1 cc of the broth is injected subcutaneously around the anal orifice about 1 inch from the center through several punctures This procedure is re*peated every three or four days* for 4 consecutive treatments The entire course is repeated after a lapse of 2 weeks

Comment It seems fairly well established that a superior, nonspecific, active immunity can be acquired by injection of nutrient broth *The results herein cited are* certainly excellent and, since the method does not necessitate hospitalization or even analgesia, it is most attractive to the patient Preparation of the broth should not be difficult in any well equipped hospital To the author's knowledge, this particular research on the treatment of pruritus ani has not been supported by reports from other sources A diversity of experiments is always desirable, in fact, necessary, in establishing a proper evaluation of a new therapy

Mercuric Sulfide Tattoo (Puncturation) In 1909, Dohi noted that syphilitic cutaneous lesions did not appear in areas tattooed with mercuric sulfide On the basis of this observation, Cattani[34] recommended therapeutic tattooing for the treatment of chronic *localized* cutaneous lesions *In 1938* Hollander [6] reported successful use with mercuric sulfide in the treatment of pruritus ani More recently, Turell and Marino [15 1 3] Taubenhaus[14] and Cantor[27 29 9] have reported their experiences The mechanism of the action of mercuric sulfide in the corium has not been determined, but some degenerative effect on the cutaneous nerves has been postulated Determination of sensitivity to mercury is required before tattooing Inflammatory conditions of the anus and rectum contraindicate the procedure All anal pathology must be meticulously corrected Of great importance is the smoothing out of the ridges of thickened skin These should be excised, and only after healing has taken place should the first step of the treatment be attempted

Technic The choice of anesthesia is a personal one Ordinarily a local block is preferred The field to be tattooed is prepared as for any anorectal operation, alcohol and ether being preferred to colored antiseptics The skin is rubbed with pheno

removal of the diseased skin, (2) severance of the sensory nerve filament supplying that skin, and (3) a combination of (1) and (2)

Elliptic Excision Followed by Suture

HERTZLER [3] DESCRIPTION Theoretically, the removal of the pruritic skin is the ideal method but unfortunately the retraction subsequent to suturing the skin margins together is ofttimes annoying and if infection occurs as has been experienced in a few of the author s cases convalescence is protracted

TECHNIC With the area under local analgesia an anteroposterior incision is made about the anal margin first on one side and then on the other Another incision elliptic in shape is then carried around the periphery of the pruritic area so that it meets the marginal incision anteriorly and posteriorly A similar incision is made on the opposite side (Fig 228) The intervening pruritic skin is removed and the remaining skin margins are closely approximated and sewed together with interrupted sutures of black silk

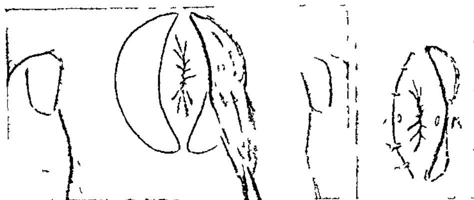


FIG 228 Hertzler s method of elliptic excision followed by suture

Young and Scott[169] have performed a radical operation which is essentially as follows An incision is made at the mucocutaneous junction around one half the circumference of the anus The mucosal edge is prevented from retracting inward by a number of guy sutures The external sphincter muscle is exposed and the scarred skin and subcutaneous tissues dissected from it A plane of dissection is found under the leathery area and the dissection carried outward to normal tissue The flap of scarred tissues which had covered one half the perianal area is then excised A flap of skin and subcutaneous tissue of correct size and shape to cover the defect is cut laterally with its base posteriorly It is swung across and sutured to the anal mucosa and to the medial line of excision The defect laterally is sutured as far as possible Since the operation is done in the lithotomy position any tension on the flaps is lessened when the legs are straightened A small rubber drain is placed beneath the flap and a snug perineal binder applied After two or three months the remaining half of the perianal skin is removed

Another procedure definitely radical in its extent is outlined by Manheim and Druckerman[93] Employed in intractable cases of pruritus ani complete relief of symptoms was cited The procedure is described briefly as follows The entire pruritic skin is circumscribed by a circular incision from two to three inches from the anal margin and excised as far as the anorectal junction The gluteal skin is mobilized and tacked to the mucosal edge above with silk mattress sutures Complete approximation is accomplished by additional sutures

While we have had no experience with this latter maneuver for pruritus ani a not dissimilar procedure was utilized for one case of circumscribed chancroidal involve

the instrument at the proper level and in mixing the ingredients which the writer has not mastered even though a few lessons of instruction were given by a professional tattooer

Ionic Therapy

This is based on the belief that pruritus is caused by an infection of the skin, due for the most part to the presence of the *Streptococcus faecalis* By means of an electric current of low voltage, certain metallic salts possessing antiseptic properties, as zinc, mercury iodine and copper, liberate ions which are driven into the deeper layers of the skin The treatments, which require special apparatus are given daily or thrice weekly over a period of several weeks, depending upon the intensity of the condition *Rolfe*[118] who applied the original principle to the treatment of pruritus ani obtained a few cures but his results do not merit its recommendation except for further experimentation Others[4, 147] found the method uncertain and have discontinued it

Electrodesiccation

It has been mentioned that, in pruritus ani, a *uniterminal desiccating current*, with the active electrode close to the skin or puncturing it superficially often affords relief by thoroughly dehydrating the area The method certainly warrants further study

Roentgenotherapy

The purpose of x ray irradiation is to decrease the cycle of hyperexcitability Exposure to x rays has been practiced by a number of workers both filtered and unfiltered rays being used The response is not directly proportional to the quantity of therapy given In fact, small doses are often as beneficial as larger doses Hermance states that about 20 per cent of cases will respond to mild x ray exposures if fractional and if not repeated too often ' "The cause for failures" *he declares "is too* strong dosage and too frequent application" The dosage is variable For example, Young advocates fractional treatments about once a week, using small doses of from 100 to 125 r at each visit for not more than four or five weeks Stokes[139] uses 400 r in six doses, and if there is no improvement, the treatment is abandoned Tomlinson[140] gives weekly treatments (75 r each) for 8 doses Saunders[110] reported on 30 patients with an average dosage of 495 r for 4 8 treatments Benefit was obtained in 21 instances but only 50 per cent of the severe cases were relieved Hailey and Hailey[6] in a series of 105 patients were able to cure 80 per cent of their cases However, Pruitt[11] reports only a 15 per cent cure of persistent cases after local causes were corrected Drueck[44] Speare and Mabrey,[133] McCutchan[17] and Granet[60] have not been impressed with the results obtained Judging *from our own observation, the results* with radiotherapy are far from encouraging There is no doubt that in the vast majority of cases the itching is alleviated In consideration however, of the fact that the relief is only temporary and that frequently distressing sequelae occur, such as radio dermatitis of severe degree which in itself predisposes to carcinomatous degeneration[100] *we recommend* that this method should be employed only after all others have failed Moreover, it should never be attempted except by a trained roentgenologist

Other Nonsurgical Treatment

Other forms of therapy, such as ultraviolet ray[6] and injections of histamine,[48] milk peptone leukocytic extract[113] and hemoglobin[144] have been recommended, but tests have shown them to be of little value or beneficial in only a few cases

Surgical Treatment

The value of surgery in the treatment of pruritus ani is indeed problematic Certainly it should be resorted to only after coexisting pathology has been corrected and the injection treatment has been given a fair trial The operative means of combating pruritus ani confines itself to (1) the

ment and in three instances for extensive anal esthiomene One patient was not followed, but two necessitated a secondary anoplasty It is probably unfair to evaluate these cases in terms of those reported which

After Treatment The petrolatum gauze is removed at the end of 24 hours, and the parts are redressed thereafter at daily intervals Mineral oil is given by mouth night and morning in doses of from ½ to 1 ounce

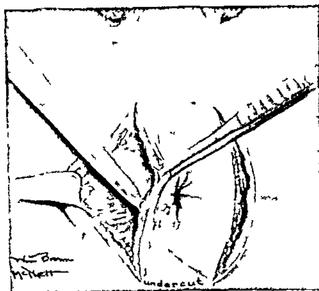


Fig 231 Ball s operation Two lateral elliptic incisions have been made the inner skin laps are retracted medially by separation from the underlying subcutaneous tissue In this way the sensory nerves are severed

were performed for pruritus ani although to the author the procedure does appear unnecessarily radical

Peripheral Division of the Sensory Nerves Ball[15 16] Description The principle on which this procedure is based is the severance of the sensory nerve filaments underlying the pruritic skin

Technic With the patient anesthetized an elliptic incision is made on each lateral side of the anus from its margin The perineal and coccygeal raphes are not included in the incision (Fig 231) By blunt dissection the flaps are raised and drawn toward the anus The incision beneath the flap on each side is carried so far as to expose the fibers of the external sphincter muscle In this way all the sensory nerves are severed completely A strip of petrolatum gauze is inserted in the open wound after which dressings are applied and held in place by a T binder

During confinement to bed compresses of hot boric acid solution are applied continually, hot sitz baths being substituted when the patient is ambulant the day following operation A warm olive oil enema is administered on the second postoperative day

Comment The author has employed this technic or modifications of it in a large number of cases with results which were seldom permanent If the anterior incisions are continued forward on either side of the perineal raphe and the intervening skin is undercut ' it will prove advantageous Many modifications of Ball s operation have been described, but in principle all are directed toward severing the sensory nerves through incisions placed in various portions of the circumference of the perianal skin Lynch[90 91] for instance accomplished this through a small anteroposterior incision on each side of the anus and about 1¼ inches from it while Krouse[85] in order to avoid

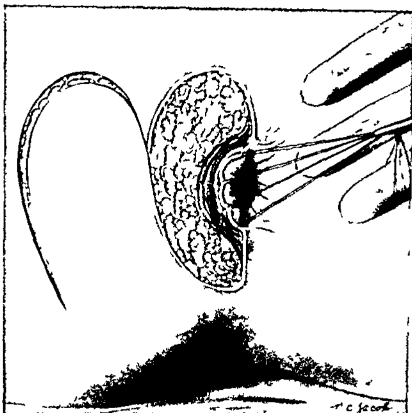


Fig 229 Showing the manner in which the flap is cut for resurfacing one half the perianal area (Young and Scott Surgery 13 911 915)

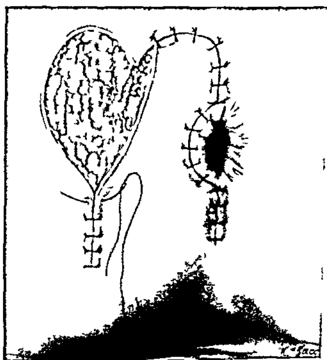


Fig 230 The flap has been sutured medically and the closure of the lateral defect begun It is usually possible to close this incision but if there is any tension the superior portion is allowed to granulate (Young and Scott Surgery 13 911 915)

the possibility of necrosis resulting from cutting off the blood supply, made from six to eight linear incisions extending from a point just outside the most peripheral limit of irritation to proceed as radii to the anal orifice, passing through the skin and into the subcutaneous tissue Montague[100] suggests a combination of incisions four slightly curved just outside the periphery of the pruritic skin and four straight, radiating from the anal margin, each incision being made approximately ¼ inch in length and extending through the skin to the subcutaneous tissue

E G Martin[94] is most enthusiastic about the undercutting procedure which he terms subcutaneous neurotomy ' Quite recently attention has been called to another modification by Kallet [80] who employs the name clover leaf for the procedure "By this technic elliptical areas of the involved skin are excised and allowed to heal by second intention The intervening bands of skin left for regeneration are thoroughly undercut This investigator is of the opinion (based on some 500 operative cases) that the cause of recurrence is inadequate and/or improper division of the nerves His recurrence rate has been nil

Linear Excision without Suture and Undercutting Minor [90] Description This combination consists of the removal of the congested veins and overlying hypertrophied skin tags as well as division of the nerves to the pruritic area

Technic Under local analgesia the parts are thoroughly cleansed with soap and water then with bichloride of mercury solution 1 5 000 The indurated skin is held with mouse tooth tissue forceps and excised Any varicose veins that may be present are dissected out A scalpel is inserted into the area and passed in a wide radius beneath the skin in order to sever the nerves between the integument and the subcutaneous tissues This severance should extend over the sphincter muscle and to the edge of the perineal raphe A posterior anotomy or sphincterotomy completes the operation Moist compresses are held in place by means of a T binder The after treatment consists of confining the bowels for from 48 to 72 hours daily cleansing of the parts, and after the local lesions have completely healed, the application of a mild ointment

Phillips[110] has proposed a radical operation for women who have had severe pruritus ani and vulvae for more than a year and who have not been benefited by more conservative therapy In performing this operation, an incision is made from a point just behind and ¾ of an inch lateral to the anus, to the level of the clitoris at a distance of ¼ of an inch from the vulvar margin Through this incision the entire thickness of the subcutaneous fat over as wide an area as possible is excised The nerve fibers are thereby excised in part rather than merely severed A similar procedure is carried out on the other side of the anus and vulva at the same sitting Careful hemostasis is practiced The wounds are closed completely by a series of interrupted sutures designed to obliterate dead spaces

Summary

It is the author s sincere belief that the etiologic factor of pruritus ani in a large percentage of cases—at least over 50 per cent—is mycotic infection and further, that there is frequently present a disturbance of the intricate physiochemical mechanism resulting in environmental change As to treatment our plan of approach is briefly as follows Each patient is carefully and thoroughly studied Medical consultation is sought and in the case of a female consultation with a gynecologist requested Smears and cultures of the anal skin and mucosa are made routinely All local pathology is corrected or removed The *p*H of the mucosa is determined Instead of toilet paper cotton or soft tissue paper preferably moistened with witch hazel is employed Impeccable cleanliness is essential Only castile soap is permitted and if this is irritating sweet olive oil on cotton is substituted Where the anal and perianal skin is acutely inflamed compresses wrung

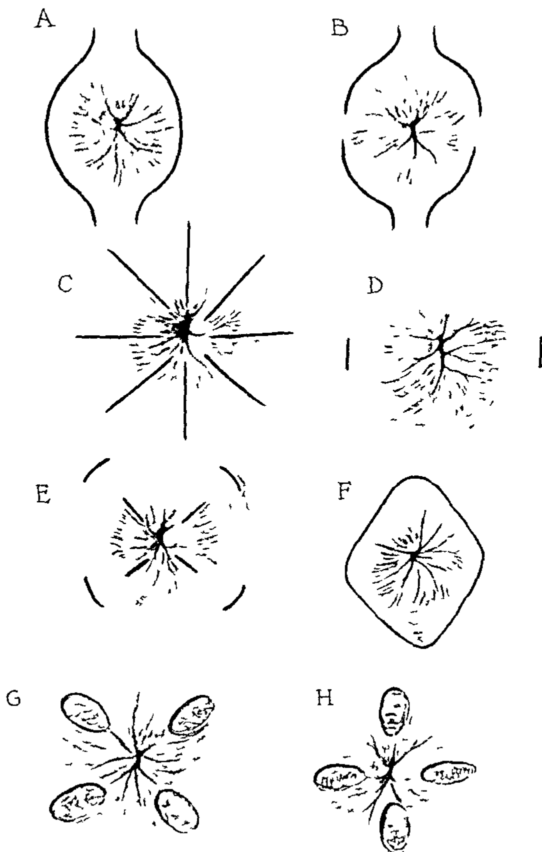


Fig 232 Types of incision advocated for undercutting perianal skin (A) Ball, (B) J C Matin, (C) Krouse (D) Lynch (E) Montague (F) Mathews (G) Minor, (H) Kallet

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SUMMARY

It is the author s sincere belief that the etiologic factor of pruritus ani in a large percentage of cases—at least over 50 per cent—is mycotic infection and further, that there is frequently present a disturbance of the intricate physiochemical mechanism resulting in environmental change As to treatment, our plan of approach is briefly as follows Each patient is carefully and thoroughly studied Medical consultation is sought and in the case of a female, consultation with a gynecologist requested Smears and cultures of the anal skin and mucosa are made routinely All local pathology is corrected or removed The *p*H of the mucosa is determined Instead of *toilet* paper, cotton or soft tissue paper, preferably moistened with witch hazel is employed Impeccable cleanliness is essential Only castile soap is permitted and if *this* is irritating sweet olive oil on cotton is substituted Where the anal and perianal skin is acutely inflamed compresses wrung

out in hot boric acid are used for from 24 to 48 hours, or Goulard's lotion (liquor plumbi dilutus) may be substituted For mycotic infestation, a modified Whitfield's or Deek's ointment (see p 233) is prescribed for the patients to apply, but in the office, potassium permanganate (saturated sol) is used locally The patient is instructed to take hot sitz baths nightly containing $KMnO_4$ and Clorox (see p 233) Attention should be given to the feet, although such patients are referred to a dermatologist In chronic cases we have found Castellani's fuchsin paint (see p 233) of utmost value For oxyuriasis gentian violet by mouth is ideal Silver nitrate from ¼ to ½ per cent solution, is frequently painted over the surface, although a solution of from 5 to 10 per cent is used in the depths of the fissured areas Not infrequently, a patient is instructed to paint the anal skin with a 5 per cent solution of mercurochrome If an application is desired for the patient who may be awakened during the night aluminum acetate (20 grains to 8 ounces of water) is soothing According to the *p*H, the acid base diet glutasin by mouth and lactose suppositories are employed (see p 235) Concerning the injection treatment, alcohol is our choice where the patient is to be hospitalized Otherwise nupercaine in oil is employed In obstinate cases, a wide undercutting procedure is instituted At no time do we advocate roentgen therapy

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CHAPTER 9

Proctitis and Sigmoiditis

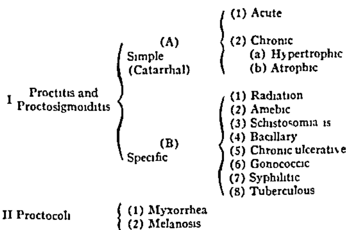
DEFINITION

Proctitis, or rectitis, is an inflammation of the rectum The process may be confined to the mucous membrane or it may involve the deeper layers or occasionally the structures immediately outside the rectum It may be limited to a small area or it may be distributed throughout the rectum, but, because the mucosa is similar to and continuous with that of the sigmoid colon, the disease ordinarily extends upward throughout the sigmoid flexure and into the descending colon[361] Colitis and sigmoiditis rarely exist without involvement of the rectum

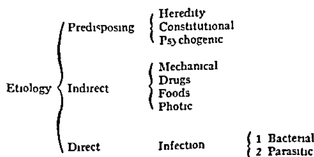
Sigmoiditis is an inflammation of the sigmoid flexure, which represents that portion of the colon extending from the crest of the ilium above to the third sacral vertebra below, or from its junction with the descending colon above to its union with the rectum below (See Chap 1, Anatomy)

CLASSIFICATION

Proctosigmoiditis, representing an inflammation of the rectum and sigmoid, may be classified as (A) simple and (B) specific



ETIOLOGY



Predisposing Causes

Heredity Structural weakness of the tissues may be inherited by some individuals, rendering them susceptible to the disease [90]

Constitutional disorders such as cardiac decompensation, pulmonary affections with stasis, hepatic congestion, gastro intestinal disturbances [1, 133] diseases of the teeth and tonsils and postinfections of those following sprue,[7] influenza, pneumonia, scarlet fever, chicken pox diphtheria and whooping cough may play an important role in the production of proctitis The importance of psychogenic factors has been emphasized repeatedly [1 77 60 73 1 700 237 9 774 315 33 340 347]

Indirect Causes

Mechanical irritation induced by hardened stools in constipated individuals, rough food particles and repeated and long continued fecal impactions [60] favor denudation of the mucosa and thus prepare for the absorption of bacteria and their toxins Diarrhea should also be mentioned Other contributing factors are hemorrhoids,[3] prolapsus strictures fistulae [74 311 316 3] ulcers cryptitis papillitis foreign bodies careless instrumentation, prostatic massage and pederasty Randall, Jackman [83] and Pugh[783] stated that pederasty in a series of their cases was responsible for the occurrence of gonorrheal proctitis The latter author detailed 5 cases of gonorrheal proctitis one due to fountain syringe tip infection this case was a female Another a male was due to the use of a pile dilator ' of his roommate A fourth case was that of a child a three weeks old female inspection of the anus revealed foul smelling discharge cultures which were reported positive for gonorrhea The author postulated that passage through the birth canal of the mother was the inciting cause the child died

Foods Dietary indiscretions such as highly seasoned foods peppers spices sauces, condiments and foods with superabundant carbohydrate value may give rise to this condition Overindulgence in alcohol should be included [60 237 774] Food allergy is an added factor [81 237]

Drugs The habitual and excessive use of purgatives does more to irritate the colon and rectum than we can possibly conceive especially such drugs as senna, jalap, aloes mercury, phenolphthalein [76] and podophyllin The injections of certain chemicals for the relief of prolapse and internal hemorrhoids, as phenol in oil,[306] alcohol and quinine and urea hydrochloride, have been reported as initiating a proctitis

Photic and Thermic Such may occur from the use of x rays and especially radium termed "factitial proctitis [1] Irrigations or enemata at too high a temperature may be included

Metals Paulsen [74] in a detailed resume stated that metals such as lead mercury, arsenic, aluminum and copper are deemed indirect causative agents in many cases

Direct Causes

Infection from whatever cause is the most frequent factor in the etiology of proctitis and sigmoiditis and may be divided into that of bacterial and parasitic origin

Bacterial The staphylococcus and streptococcus are the most common pyogenic organisms found, although the colon bacillus which normally is present and which seemingly develops pathogenic characteristics when the rectum is infected with the above organisms is present in large numbers Attention has been drawn to the fact that these organisms appear in blood agar culture only if pathologic, although a fresh fecal smear will show them to be present at all times [1 1] Other organisms to be found are *B pyocyaneus* [23] *H influenzae* *B proteus* [123] *B typhosus* *Myco tuberculosis* [76 108 73] *B dysenteriae* *C diphtheriae* *B pneumoniae* *Vincent s spirillum* [180] *N gonorrhoeae* *B coli* *B proteus valeriei* [1] *B necrophorus* (*Dack*) [106 237] *Morgan s bacillus No 1* [23 106] *S viridans* [774] *S hemo*

lyticus,[173] *S aureus*[1 8] *S faecalis*, [217] *Salmonella group*[90] *Clostridium*[90] *Esch coli*,[1 8 217] and the *Shiga Sonne*, *Schmidt's* and *Flexner* groups

Parasitic Helminths such as *pinworms* (*Oxyuria vermicularis*), roundworms (*Ascaris lumbricoides*) and tapeworms (*Taenia saginata*), may give rise to an inflammation of the rectum, as also the *Endamoeba histolytica* and the *Treponema pallida*

Additional parasitic causatives are *Balantidium coli*,[2 1] the cestodes[290] nematodes and trematodes[90] *Coccidium hominis*,[290] *Giardia lamblia*,[290] *Pseudomonas aeruginosa*,[1 8] *Trichomonas hominis*[290] and schistosomiasis[316]

Acute Catarrhal Proctitis PATHOLOGY The acute process is confined usually to the mucous membrane which appears swollen, congested and bright red in color If it is of mild intensity the inflammation may subside and the mucosa return to its normal appearance, but if it is marked, the deeper structures become infiltrated Pathologically, all types may become fibrinous suppurative hemorrhagic gangrenous or ulcerative, so that various sequelae, such as stricture,[4 23 60 9 108 189 190 274] abscess[23 26 61 1 8 274 310] and fistula may ensue[1 3 1 8 74 3 3]

SYMPTOMS Acute proctitis is of sudden onset and is characterized frequently by a chill and an elevation in temperature A sense of discomfort fullness or burning in the rectum is complained of by the patient, while in some cases actual pain may be related A frequent and urgent desire for stool usually exists but each time the individual defecates only a few ounces of liquid material escape so that because of long continued and ineffective straining violent "tenesmus" ensues The latter usually incites painful and frequent urination Occasionally the pain is referred to the sacrum pelvis or down the limbs The fecal discharge is watery but later contains mucus tinged with blood Depending on the virulence and extent of the infection, constitutional symptoms as loss of appetite headache, fever and general malaise soon develop

DIAGNOSIS On inspection, the anus appears reddened from the irritating discharge emitted through the canal As the lubricated, gloved finger is introduced, it is noted that the tissues are tender and the sphincter muscle is spastic, so that considerable pain may be experienced by the patient unless extreme care is exercised At times an anesthetic may be required At first the parts feel swollen and feverish, but later, because of the discharge, the surfaces are moist and slimy Proctosigmoidoscopy reveals the mucosa as highly colored and edematous, while scattered here and there are sticky plaques of mucoid material which assumes at times the appearance of a pseudomembrane[361] In all cases a painstaking abdominal examination should be a routine procedure The presence of parasites may be determined by examination of the stool microscopically and at times macroscopically For routine use, Donaldson's iodine eosin stain is recommended[37] For their detection, the worms, their segments embryos and ova should be sought

The NIH swab as suggested by Wright et al, has been found to be an effective diagnostic procedure Since the ova are deposited in the anal canal during the night, the test must be performed immediately upon rising in the morning, prior to cleansing The cellophane portion of the glass rod is placed in the anal orifice and twisted gently two or three times, thus depositing the ova in the folds of the cellophane The rod is then placed in the tube and brought immediately to the laboratory Three negative tests are necessary in order to definitely rule out the presence of the parasite The efficacy of treatment may also be determined accurately by using this test

The *Oxyuris vermicularis* (pin seat or thread worm) which occurs most commonly in children, is of small size, measuring approximately 4 12 mm in length

it is white in color and extremely active The eggs are irregularly ovoid and may be found in the feces or upon the surface of the mucosa [291] The *Ascaris lumbricoides* (roundworm) is cylindric in shape and of a yellowish brown or reddish color The female worm varies in length from 7 to 14 inches and the male from 4 to 8 Quite characteristic are the four longitudinal bands and transverse striations [19] The diagnosis of *Taenia saginata* (beef tapeworm) is not difficult since its segments are recognized frequently in the feces In doubtful cases it is well to administer a purgative and search for the ova, which may be noted by their brown color Infestation with the *Strongyloides intestinalis* is the causative factor in strongyloidiasis [136] Giardiasis is a relatively common infection of childhood especially prevalent in institutionalized homes in the southern United States From two thirds to three fourths of the patients are spontaneously freed of the organism during adolescence the remaining infections tending to persist [136]

Treatment Ordinarily, mild cases of proctitis will subside in a few days under proper therapeusis Local causes such as impaction and foreign bodies should be removed

Rest in bed is advisable since the erect posture increases the local congestion and venous stasis

The diet should be soft residue free and nonirritating It should contain a high vitamin content Gruels of oatmeal rice barley egg albumin gelatin broths as lamb beef or chicken lean chopped beef and fermented milk should be consumed in moderate quantities Some authorities advise the ingestion of onions salted herring and grated carrots A liberal amount of water is beneficial Such foods as cabbage corn celery raw fruits [30] pastries gravies, lobster crab alcohol and milk are interdicted Irrigations of plain water, normal saline solution or sodium bicarbonate, from 1 to 2 per cent solution may be given twice daily using hot water (110° F) Retention enemas of warm olive oil are soothing to the mucous membrane and may be used to allay tenesmus Instillations of ichthyol, 25 per cent aqueous solution, or hexylresorcinol 25 per cent solution, are advocated once or twice daily Erosions may be treated by topical applications with silver nitrate, 10 per cent solution through the sigmoidoscope

Chronic Proctitis Chronic catarrhal proctitis and sigmoiditis are of common occurrence and may be divided into two types which represent retrograde changes (1) the hypertrophic and (2) the atrophic

Hypertrophic Type *Pathology* This form, which is usually secondary to the acute variety, represents a hypertrophy of the mucosa and submucosa The surface is swollen and moist, the exudate mucopurulent and quite profuse Hypertrophy of the glands of Lieberkuhn is noted as well as an increase in the number and size of the goblet cells Ulceration is not infrequent Unlike the atrophic form this type is not confined to the rectum alone but extends to the pelvic and iliac colon

Symptoms Diarrhea alternating with constipation, the former a semiliquid material composed of mucus blood and feces, is a constant but not characteristic feature Pain at defecation may be present In many instances because of the profuse discharge excoriation of the anal and perianal regions is not uncommon so that frequently pruritus and fissure may result General symptoms however, are prevalent, especially flatulence loss of appetite, coated tongue headache and lassitude

Diagnosis On digital examination the mucous membrane feels soft and doughy with closer approximation of the walls of the rectum than is normal [28] Through the proctosigmoidoscope the mucosa appears edematous thickened and of pale color A thin whitish secretion is spread over the membrane which, when wiped off, leaves a somewhat granular surface

Differential Diagnosis Differentiation be

tween the hypertrophic and atrophic types is made by digital and proctosigmoidoscopic examination

Treatment Primarily, any causal influence should be removed, since the treatment of hypertrophic proctosigmoiditis is not only prolonged and tedious but somewhat uncertain Because the hypertrophic type is usually secondary to a chronic intestinal toxemia,[39] the entire intestinal tract should be considered and properly treated, as well as its lower segments

A bland diet causing a minimal amount of putrefaction and leaving but little residue similar to that prescribed under the acute catarrhal type, is advocated Acidophilus milk has been found beneficial Many of these cases will show a marked response to sulfasuxidine, 0 5 Gm per kilo of body weight Where marked toxemia is present, sulfathiazole or neoprontosil may be added It is more than likely that a synergistic action exists in connection with this form of therapy which tends to make the combination of them desirable Irrigations with physiologic salt solution, tannic acid solution 1 per cent, potassium permanganate 1 8,000, or salicylic acid 1 1,000 may be used to advantage Eroded areas are treated topically through the sigmoidoscope with silver nitrate from 5 to 10 per cent solution methylene blue 5 per cent balsam of Peru, 10 per cent or protargol, 1 per cent Instillations into the rectum of warm olive oil are soothing and will relieve spasmodic contraction of the sphincter and levator muscles For associated fermentation and putrefaction salol bismuth charcoal or betanaphthol may be employed in 5 grain doses thrice daily

ATROPHIC TYPE *Pathology* This variety, which is confined usually to the rectum represents an atrophy of both the Lieberkuhn glands and the interglandular structures The mucosa is thin, dry inelastic and cracks easily Small areas of necrotic epithelium may be seen Histopathologically sections show atrophic changes with a diminished number of goblet cells Usually the submucosa is interspersed with fibrous tissue which occasionally may be seen involving the muscular layer

Symptoms Constipation is frequent although intermittent attacks of diarrhea may occur, in which case blood and feces compose the discharge The patient complains of fullness or discomfort in the rectum which is accentuated by the act of defecation The stools are hard, dry and lumpy and may be streaked with mucus and blood Constitutional symptoms as flatulence, anorexia, furred tongue malaise and loss of weight, are often present

Diagnosis The examining finger elicits the mucosa as dry and inelastic, and upon proctoscopy the membrane appears rough and granular Erosions and ulcerations are noted and small areas of necrotic epithelium may be seen attached to the mucosa

Treatment The diet should be nonirritating, with little residue but as nutritious as possible Irrigations or enemata should be used to empty the lower bowel of its contents Cascara in liquid form assists in stimulating intestinal peristalsis[26] Silver nitrate, from 5 to 10 per cent solution applied through the sigmoidoscope will help to heal the ulcerations In order to soothe the bowel and lubricate the feces nightly injections of three ounces of liquid paraffin containing ½ per cent of menthol are recommended[122]

Complications and Sequelae Extensive ulceration may result in abscesses[23, 66, 18, 274, 34] fistulae[28, 128, 373] fissures[106, 32] and stricture[24, 66, 79, 106, 139, 274] Due to the irritating discharge pruritus and excoriation of the perianal region may occur Arthritis too, may supervene[112] While malignancy has been reported following local ulceration[4, 26, 66, 70, 71, 306] peritonitis may occur from perforation above the peritoneal reflection[4, 7, 159, 184, 373] Embolism or infarction may also take place As Drueck remarks, "The local focus of infection is to be regarded not only as a portal of entry

TABLE 10 DIFFERENTIAL DIAGNOSIS

	HYPERTROPHIC	ATROPHIC
Appearance	*Moist, swollen*	*Dry, brittle, granular, inelastic*
Bleeding	Slight	Bleeds easily
Mucus	Moderate or profuse	Slight
Ulceration	Not common	More common
Usually associated with	Polyps pruritus	

but also as a site in which organisms multiply, develop their virulent properties and perhaps acquire a specific pathogenicity and an elective affinity for certain tissues The disparity between the frequency of foci of the infection and resulting disease is apparently largely due to natural resistance, immunity and virulence of the organism

As to sequelae of parasites severe anemia reflex paraplegia[1, 3] and delirium[10] have been reported as occurring during their infestation

TREATMENT CHART OF INTESTINAL PARASITIC DISEASES

TYPE OF PARASITE	THERAPY AND MODE OF ADMINISTRATION
Pinworm *(Enterobius vermicularis)*	1 Gentian violet medicinal *the four and one half* hour Seal Ins or Enseal tablets have an apparent superiority over those with ordinary enteric coating according to D Antoni and Sawitz[139] They release the *medication at the specified* time in the bowel irrespective of the pH The dose for children is 0 01 Gm for each year of age and for adults two tablets three times daily containing 0 03 Gm of the drug Following an interval of one week they are to be repeated 2 Caprokol (Hexylres*orcinol) in 0 2 Gm* capsules for adult dosage and for children the dosage is to be cut in half Five capsules are to be administered in the A M on a fasting stomach Two hours later administration of magnesium sulfate per oram, and nothing to eat for a five hour period
Roundworm *(Ascaris lumbricoides)*	Caprokol is found ideal and is administered by the same method as for pinworm
Hookworm *(Ankylostoma duodenale)*	1 Tetrachloroethylene in *1 cc capsules* The *night* prior to initiation of treatment a saline purge is administered and no food is to be ingested the day of treatment Three of the 1 cc capsules are given in the morning followed in 2 hours by a repeated saline purge An interval of one week is to elapse before treatment is repeated Dosage for children is 3 minims for each year of age 2 Caprokol same method of treatment as for pinworm
Whipworm *(Trichuris trichiura)*	Method of treatment same as for hookworm using either of the medications as above
Schistosomiasis (Fluke Disease)	1 Fuadin 2 *Tartar emetic*
Tapeworm *(Taenia saginata)*	Oleoresin aspidium in 0 6 cc gelatin coated capsules This form of therapy is contraindicated in anemia pregnancy cardiac or hepatic disease A purge is given the *night before treatment* Patient is kept in bed and given water or tea for breakfast Two of the 0 6 cc capsules are administered every half hour for three doses two hours later the saline purge *is again* administered The dosage for children is one minim for each year of age up to and including the twelfth year

Strongyloides stercoralis	Gentian violet medicinal, the four and one half hour Seal ins or Enseals same dosage and method of treat ment as for pinworm infes tation

Specific Proctosigmoiditis

Radiation Proctitis Originally de scribed by Futh[1 1] in 1915, and termed "factitial" proctitis by Buie and Malm gren,[71] this represents an inflammatory process resulting from the use of radium, usually in the treatment of malignancy of the cervix uteri Other instances have been cited [08 319] As previously reported, the author observed 89 cases of this condition the result of interstitial, extrarectal irra diation

Pathology The stage of congestion or hyperemia of the rectal mucosa is noted in the early or incipient cases The process is observed first on the anterior rectal wall and begins from approximately ¾ to 1 inch above the anorectal line to extend upward for a distance of from ½ to 1 inch Exami nation elicits usually a circumscribed area of thickening not unlike a few layers of thin wet cardboard in the anterior rectal wall The mucosa is nonadherent reddened edematous[73 1 3 1] and covered to a slight degree by a *noncharacteristic mucoid* exudate[9]

The second or ulcerative stage is usually quite characteristic as far as the findings are concerned Here the thickening is more marked, with extension laterally rather than longitudinally The mucosa seems quite adherent to the deeper layers, a distinct change from the initial stage Situated on the anterior rectal wall or at times slightly to one side, there is present a horizontally oval, irregularly rounded ulceration from ½ to 1½ inches in extent It occurs as a pearly white or grayish plaque giving the impression of being plastered on the sur face, but close inspection reveals it to be a necrosis of the mucosa and often the sub mucosa [9 1 8 -40] Frequently a dirty sticky material is present over the surface of the membrane, but this can be swabbed away easily leaving a clear membrane as above described The center appears slightly ele vated and the edges are somewhat de pressed, forming a prominent gutter with the surrounding mucosa This membrane is quite adherent and tough, so that if it is pulled away, a deep ulcer remains which bleeds considerably After a period of from ten to fourteen days the center is looser and the edges are elevated, while still later the necrotic membrane begins to slough away Fourteen cases in this series devel oped a recto vaginal fistula which opened directly in the center of the ulcer The mu cosa immediately adjacent is more or less atrophic and pale so that the small blood vessels are unduly prominent This te langiectasis, according to Buie, is pathog nomonic Randall and Buie[78] treated 88 cases of this entity The location varied up to 20 cm above the anorectal margin the average distance above this point being 9 cm The factitial ulcers were found in the same area as the proctitis Others have dis cussed *this subject also* [4 98 176 00 16]

In the third stage, where a stricture has formed, there is an organized narrowing of the rectal lumen from approximately ¾ to 1½ inch above the anorectal line[1?9 316] It is usually *annular* and may be partial or complete but is devoid of the nodular excrescences usually palpated in primary or extended malignancy Although not charac teristic ulceration is frequent, because of secondary infection and the progress of the disease

Symptoms In almost every instance the patient will mention that some form of *treatment has been* given previously but that now the complaint is rectal Bleeding is usually cited and although slight in amount, is sufficient to worry the patient and cause him to seek medical attention In some cases *the bleeding* is described as bright red but in those of longer dura tion it occurs in the form of dark clots most frequently at the time of bowel move ment Ordinarily the blood is small in

amount but occasionally a profuse hemorrhage is cited The initial discomfort is indefinitely described as a dull aching sensation Occasionally however the pain is of a burning nature Later tenesmus of varying intensity occurs the result of sphincteric irritability from the inflammatory process Such symptoms as frequent and urgent desire for stool incomplete evacuations fecal discharges mixed with mucus blood pus and necrotic material are cited where a stricture is present

DIAGNOSIS With the presence of a pearly white plaque situated on the anterior rectal wall and a history of interstitial uterine irradiation there is little difficulty in making a diagnosis of radiation proctitis (Fig 233) However this process not uncommonly encircles the rectum and when such occurs it is often no easy matter to decide whether it is the result of radiotherapy or an extension of a malignancy Of course the history is of value but does not rule out the possibility of extension Where malignancy has extended to the rectum there is no typical membrane and the constriction is irregular and nodular in contrast to the more even distribution of the fibrosis resulting from irradiation Repeated negative biopsies from different portions of the stricture are the only absolute means of ruling out malignancy

TREATMENT Obviously the irradiation treatment is discontinued although Buie [9] thinks otherwise being of the opinion that this must be regarded as a chance every surgeon takes when instituting the treatment In the first and second stages palliative treatment is effective but the presence of stricture usually necessitates surgical intervention Palliation consists of rest in bed a soft bland diet and liquid petrolatum by mouth Absolute cleanliness will do much in itself to aid the process of healing and to this end a warm enema of plain water following each defecation is advised Compresses wrung out in hot boric acid solution and applied to the perineum and hot sitz baths offer temporary relief Instil-



FIG 233 Radiation proctitis showing large pearly plaque on anterior rectal wall The distinct edges and the telangiectasis may be noted (H E Bacon Radiology 29 574)

lations of warm olive oil two ounces thrice daily are soothing and will relieve the tenesmus while ichthyol 25 per cent aqueous solution and hamamelis water are also of value Gentian violet 1 per cent solution or balsam of Peru applied to the ulcerated surface every second day is beneficial Vitamin E (tocopherol acetate) 100 mg thrice daily has been recommended

In 1936 the author[9] reported a group of 39 patients with factitial proctitis To the present 50 additional cases have been observed totaling 89 Of this number 23 showed varying degrees of stricture formation for which a double barreled colostomy was instituted in 12 Contrary to the opinion of a few investigators it is our belief that surgical divergence of the fecal stream is of utmost benefit in the presence of marked stricture formation and especially where a rectovaginal fistula is associated

Amebic Proctosigmoiditis DEFINITION Amebiasis [31] amebic dysentery amebic enteritis or colitis is a parasitic disease of the large intestine caused by the *Endamoeba histolytica* and characterized by intestinal disturbances such as abdominal pain intermittent attacks of diarrhea and constitutional symptoms The parasite belongs to the class of *Rhizopoda*

INCIDENCE Amebic dysentery known to

Strongyloides stercoralis	Gentian violet medicinal the four and one half hour Seal ins or Enseals same dosage and method of treatment as for pinworm infestation	

SPECIFIC PROCTOSIGMOIDITIS

Radiation Proctitis Originally described by Futh[1] in 1915, and termed 'factitial' proctitis by Buie and Malmgren,[1] this represents an inflammatory process resulting from the use of radium, usually in the treatment of malignancy of the cervix uteri Other instances have been cited[98, 301] As previously reported, the author observed 89 cases of this condition, the result of interstitial, extrarectal irradiation

PATHOLOGY The stage of congestion or hyperemia of the rectal mucosa is noted in the early or incipient cases The process is observed first on the anterior rectal wall and begins from approximately ¾ to 1 inch above the anorectal line to extend upward for a distance of from ½ to 1 inch Examination elicits usually a circumscribed area of thickening not unlike a few layers of thin wet cardboard in the anterior rectal wall The mucosa is nonadherent, reddened, edematous[, 173, 1] and covered to a slight degree by a noncharacteristic mucoid exudate[9]

The second or ulcerative stage is usually quite characteristic as far as the findings are concerned Here the thickening is more marked, with extension laterally rather than longitudinally The mucosa seems quite adherent to the deeper layers a distinct change from the initial stage Situated on the anterior rectal wall or at times slightly to one side there is present a horizontally oval, irregularly rounded ulceration from ¼ to 1¼ inches in extent It occurs as a pearly white or grayish plaque giving the impression of being plastered on the surface, but close inspection reveals it to be a necrosis of the mucosa and often the submucosa[7, 1, 5, 210] Frequently a dirty sticky material is present over the surface of the membrane, but this can be swabbed away easily leaving a clear membrane as above described The center appears slightly elevated and the edges are somewhat depressed, forming a prominent gutter with the surrounding mucosa This membrane is quite adherent and tough, so that if it is pulled away, a deep ulcer remains which bleeds considerably After a period of from ten to fourteen days the center is looser and the edges are elevated, while still later the necrotic membrane begins to slough away Fourteen cases in this series developed a recto vaginal fistula which opened directly in the center of the ulcer The mucosa immediately adjacent is more or less atrophic and pale, so that the small blood vessels are unduly prominent This telangiectasis, according to Buie, is pathognomonic Randall and Buie[] treated 88 cases of this entity The location varied up to 20 cm above the anorectal margin the average distance above this point being 9 cm The factitial ulcers were found in the same area as the proctitis Others have discussed this subject also[71, 98, 1, 6, 200, 216]

In the third stage, where a stricture has formed, there is an organized narrowing of the rectal lumen from approximately ¾ to 1½ inch above the anorectal line[150, 316] It is usually annular and may be partial or complete but is devoid of the nodular excrescences usually palpated in primary or extended malignancy Although not characteristic, ulceration is frequent, because of secondary infection and the progress of the disease

SYMPTOMS In almost every instance the patient will mention that some form of treatment has been given previously but that now the complaint is rectal Bleeding is usually cited and although slight in amount is sufficient to worry the patient and cause him to seek medical attention In some cases the bleeding is described as bright red but in those of longer duration it occurs in the form of dark clots most frequently at the time of bowel movement Ordinarily the blood is small in

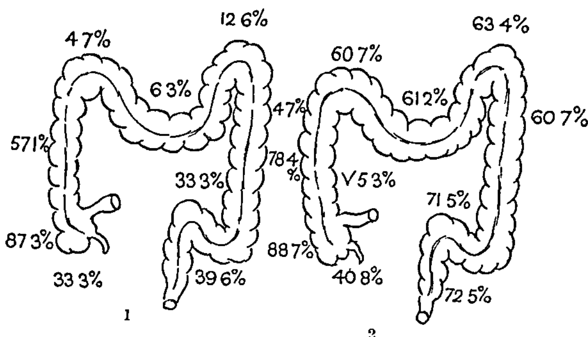


FIG 234A Diagrams showing distribution of amebic lesions in the appendix colon and rectum (after H C Clark, 1924) (*Left*) Regional distribution in 186 cases (*Right*) Regional distribution in 63 cases Note the incidence of lesions in the cecum sigmoid and appendix The dependent portions represent the regions where the greatest stasis exists in the colon and which afford a resting place for the development of the amebae The primary locations are found in the cecum, ascending colon rectum sigmoid and appendix (Manson Bahr P The Dysenteric Disorders Baltimore Williams & Wilkins p 155 1943)

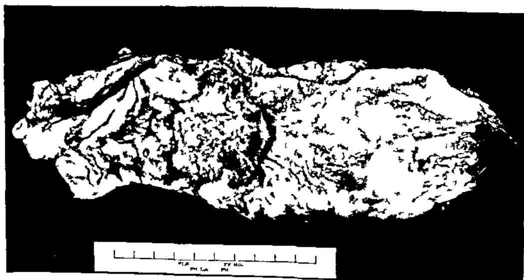


FIG 234 B Amebic ulcerative colitis associated with carcinoma of rectum

antiquity, is a hazardous and ubiquitous disease frequently occurring endemically and epidemically in tropical countries but also is met with throughout the United States Craig[98] made the assertion that "at least 10,000,000 people in the United States *today harbor the pathogenic intestinal protozoan* which is the causative agent of amebiasis in its various forms, including amebic dysentery "

Hummel[1?6] stated that this widespread entity affects from 6 to 10 per cent of the country's entire population While it is true that the incidence is surprisingly high, the figure according to Craig is probably even closer than he first estimated, being more in the neighborhood of 13,000,000 cases

Barr[31] reported that the incidence in 69,000 individuals surveyed in the United States (figures collected by him) has been a little better than 10 per cent Various statistics show that the middle class is afflicted more frequently than are the poor or indigent Males are more prone to become infected than females[33, 3?7] and by far the greater majority of cases occur in adults[323, 31?] Carter[8] stated that during World War II millions of servicemen have been exposed in geographical areas favorable to the transmission and maintenance of the disease On Bataan alone it was estimated that from 30 to 40 per cent of the troops contracted some form of amebic dysentery As a result there will be many carriers who will act the role of transmitters of the disease in their local communities when separated from the services

Etiology The comparatively small number of cases in which the parasite is suspected and finally demonstrated is out of all proportion nevertheless, to the seriousness and widespread distribution of the disease The parasite gains ingress into the intestine through ingestion of raw vegetables, fruits and water which have been contaminated by human excreta harboring cysts Although flies may convey the cysts from dejecta to food[?0] in this country food handlers who are carriers of the parasites are usually the direct media of contact [3] Apart from the carrier hypothesis, infection may spread from the wind, soiled toilet paper blown from open latrines and possibly also from dust, provided the cysts have not had time to dry and perish When the cysts are swallowed, they pass through the stomach and encyst in the intestine The liberated amebae are virulently pathogenic and one of the most destructive microorganisms inhabiting the intestinal canal

Parasitology The *Endamoeba histolytica* is the sole pathogenic ameba affecting the human economy [7] Two phases exist the vegetative or active, and the quiescent or encysted The parasite is capable of movement by means of pseudopodia Chisholm[4] credits it with having three stages in its life cycle a vegetative, a precystic and a cystic stage They are transmitted from man to man in *the cyst* form exclusively

a) The vegetative stage Here, reproduction occurs by binary fission The ameba is a colorless, motile, unicellular organism, spheroidal in shape and from five to eight times the diameter of an erythrocyte[115] It

Fresh Preparation	Endamoeba Histolytica	Endamoeba Coli	Endamoeba Nani	Iodamoeba Buetschlii
Chromidial	Present	None	None	None
(1) Iodine stains body	Differs	Differs	None	Dark brown
(2) Nuclei	1 2-4	8	4	1
(3) Chromatin of nucleus	Small dots on nuclear membrane	None	Large mass at one side	None
(4) Size	10—15 u	11 u	9 u	1?

sidered it from two angles: amebiasis in relation to simple conditions, such as piles, fissure, fistula and fibrous stricture, and the latter angle from conditions simulating neoplasm. Hemorrhoids, both internal and external, common concomitants of amebic dysentery, usually resolve as the dysentery is brought under control, although in exceptional cases operation may be required at a later date. Prolapse will act in a similar manner. Hemorrhoids due to a mild or chronic dysentery are of greater surgical importance, for the dysentery may be far from obvious and operation may be ill advised; these are potential surgical catastrophes, the interference in some cases being followed by an acute exacerbation of the dysentery—a definitely unwelcome sequel to a rectal procedure—and in addition by severe local complications and even the formation of hepatic abscesses. In the Chicago epidemic of 1933, six of the cases were operated on for hemorrhoids, one of them dying as a result. Contrary to earlier ideas, the view is now held that amebic dysentery rarely produces fibrous stricture of the rectum. It is often impossible to determine the nature of the infection concerned, for, apart from conditions such as lymphogranuloma venereum, stricture may follow many varieties of proctitis due to nonspecific causes. Even where they do result from amebic infection, identification of the organism may present great difficulty. One such case occurred in a series reviewed by Hawe. The author stated that Jackman noted a low incidence of fistula and anorectal abscess in this disease and contrasted his figure of 1.7 per cent with the 30 per cent he found in cases of regional ileitis, and 8.4 per cent in ulcerative colitis. In the author's series, two instances of fistula in ano occurred. Extensive perianal ulceration was more or less commonplace prior to the introduction of modern treatment; this is rarely present today and principally on that account the diagnosis may be missed when dealing with the chronic cases.

AMEBIC LESIONS SIMULATING NEOPLASM. In cases of long standing, multiple polypoidal excrescences of granulation tissue or edematous mucosa are sometimes observed during sigmoidoscopy; these may be mistaken for simple neoplasms. Under emetine therapy they usually are eliminated; should they persist, biopsy should be done. In the last few years, from time to time, attention has been called to the chronic amebic ulcer or an area of granulation tissue assuming the appearance from a clinical standpoint of rectal carcinoma. Differentiation may be made, however, by the absence of typical induration characteristic of carcinoma, but, at times, there are frequent occurrences in which this clinical picture is indistinguishable from those of malignancy.[7-9] Landsman,[10] in reporting a case of amebic dysentery complicating the diagnosis of carcinoma of the rectum, stated that in a ten year search of the literature but 15 such cases were uncovered. His case was a true instance of the coexistence of the two entities, both occurring in the same individual at the same time.

McConaghey[1] reported a case of rectal amebiasis which also involved the anus. This was a case of amebiasis cutis of the perineum, the first to be reported from British India and Burma, no account of any such occurrence having been reported in British medical literature. The disease, however, appears to have occurred wherever amebiasis is particularly common. The author felt that the rise in the incidence of amebiasis, particularly noticeable in India during recent years, may be accompanied by a concomitant increase in its local manifestations. It so closely resembles the venereal type of granuloma that mistakes in diagnosis may occur.

SYMPTOMS. The extreme variations in symptomatology are in direct proportion to the virulence of the infection and the resistance of the individual. Usually three types are described: (1) the acute, (2) the chronic, and (3) the latent or carrier type. However, in many cases no sharp line of demarcation can be drawn, as each shades

possesses a distinct, homogeneous, refractile ectoplasm seen most clearly as a broad zone at the ends of the pseudopodia The granular endoplasm contains one or more digestive vacuoles, a small, round nucleus usually indistinct, and frequently, ingested red blood cells and bacteria[81, 101] Where the environment is unfavorable to further development the parasite assumes a round shape,[300] becoming nonmotile, and finally undergoes encystation The cysts are capable of existing in water for approximately 150 days In the precystic stage the parasite becomes very sluggish and shrinks in size and at this stage is barely distinguishable from *Endamoeba coli* While it is generally taken for granted that this organism is the only ameba capable of pathogenicity, Chisholm stated that there are certain others capable of causing symptoms either alone or in combination with the *E histolytica* They are the *Endamoeba coli*, *nani* and the *Iodamoeba buetschlii* As far back as 1922, Orticini definitely demonstrated pathogenicity for *Endamoeba coli* Phagocytosis of red blood cells tends to establish pathogenicity for those assuming it and is a definite diagnostic point

b) QUIESCENT OR ENCYSTED STAGE Fully developed cysts are much larger than those of the precystic stage Each contain four nuclei which are somewhat characteristic In stained specimens these nuclei are round with a thin, uniform ring of chromatin granules and a central homogeneous karyosome surrounded by a halo The preceding table will show differential characteristics between this and the nonpathogenic type of organisms There is a further differentiation on page 270

PATHOLOGY The amebae are ingested in cyst form where they invade the submucosa of the large bowel[193] especially the cecum sigmoid flexure[4] and rectum[155, 30] After shedding its capsule, the cyst assumes motility and the characteristics of a true parasite[203] In the wall of the bowel it ingests and feeds upon the red blood cells and produces its destructive effects The process is essentially one of exudation, productive inflammation with secondary necrosis At first, minute, reddish dots appear on the mucosal surface, later assuming a yellow citron color and large size As a result of the necrosis ulceration ensues the degree depending on the virulence of the organism and the resistance of the host[92] These ulcers arising above the surface of the mucous membrane, are irregular, round or oval in contour, undermined edges ragged and elevated the base being depressed, grayish yellow in color and necrotic Hawe[168] found these ulcers scattered throughout the intestine in 61 per cent of the cases, while isolated areas were alone involved in 34 per cent and in the following order of frequency cecum ascending colon rectum, sigmoid appendix, splenic flexure and the hepatic flexure Hamzah[167] stated that subacute appendicitis may be the sole indication of amebic infection and in order to prevent greater and serious complications, medical treatment should be followed by appendectomy In Palestine the *E histolytica* is the causative factor in from 20 to 30 per cent of all cases of subacute or chronic appendicitis In a consecutive series of 50 appendices removed at the Government Hospital, Haifa, the author found 13 patients with ulcers containing living amebae seen in both smears and tissue sections The ulcers may be discrete or confluent, but have a tendency to follow the blood vessels thus encircling the gut[93] The valves of Houston and the prominent folds of the gut are common sites[98] The intervening mucosa may appear slightly inflamed or almost normal At times, edema hyperemia and hemorrhage are noted In long standing cases marked submucosal thickening also involving the muscular layer will occur due to fibrous tissue replacement In the event of healing taking place, contracture and subsequent narrowing may develop resulting from chronic productive exudate

In discussing amebiasis of the rectum and anal canal, Hawe (*loc cit*) con

extended periods, and it is these forms which, if ingested, are the causatives of infection The trophozoite is more easily diagnosed and recognized than is the cystic form[90]

The picture as presented by proctosigmoidoscopy is of value and somewhat characteristic (Fig 236) Hirschman[100] calls attention to the fact that papular spots may be seen with a white or yellow point of necrosis which soon becomes the ulcer Usually the ulcers are discrete and may involve either the upper or lower surfaces of the valves of Houston or a prominent fold of the bowel wall[77] The ulcers are irregular, occasionally round or oval with ragged, undermined edges and a grayish yellow necrotic base In an early case, the surrounding mucous membrane may appear slightly inflamed, while later edema and hemor

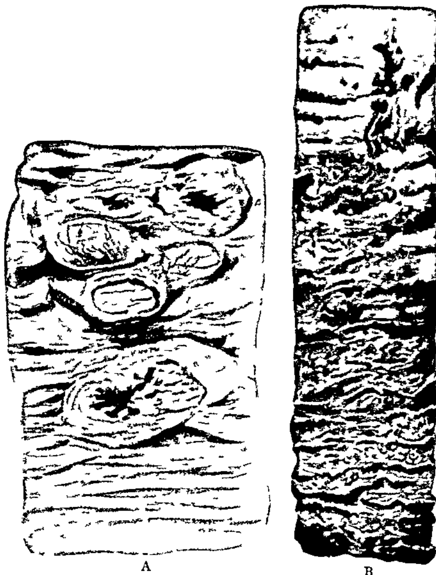


FIG 235 (A) Amebic dysentery typical patches of infiltration and ulceration (B) Bacillary dysentery (Shiga infection) coagulation necrosis of lower portion of ileum showing characteristic green coloration of the destroyed mucous membrane (P H Manson Bahr Manson s Tropical Diseases London Cassell)

quite imperceptibly into the other[4, 137]

IN THE ACUTE TYPE The onset is sudden and characterized by severe, cramping abdominal pain and diarrhea The stools, numbering at first from approximately 10 to 20 per day, are semisolid, slimy and mixed with mucus Within a few days they may increase from 20 to 40,[1 0] at which time they become more watery and contain pus and shreds of mucous membrane Occasionally a large amount of blood is noted[03] A sense of "unfinished business" or incompleteness is experienced at each call to stool, so that, as the result of long continued straining, violent tenesmus ensues In some cases, colicky, lower abdominal pain is present, while at other times nausea and vomiting are experienced Rigors, pyrexia, cephalalgia and general malaise are present As a result of the diarrhea, which may last for days weeks or even months, severe constitutional symptoms may supervene, as weakness, emaciation, loss of weight, severe prostration and at times delirium[8]

IN THE CHRONIC TYPE *The symptoms* vary in accordance with the activity or quiescence of the process, being usually described by the occurrence of repeated exacerbations of diarrhea, which may or may not alternate with constipation[01] From 10 to 15 stools may be passed daily, mixed with mucopurulent material and blood Occasionally cramps in the lower abdominal quadrants, over the sacrum and in the rectum exist Anorexia general lassitude and weakness are concomitant occurrences

IN THE CARRIER STAGE Some individuals possess a natural immunity to the disease these are the type more apt to become 'carriers," for it has been demonstrated[117] that such individuals may harbor and pass the cysts in their stools without themselves being infected Chisholm[84] stated, 'this type may show only minor symptoms or none at all" However, it is the author s opinion that there is no such type as a "healthy carrier" Many of these cases are often diagnosed as gastric allergy, neurosis, mild gastro intestinal upsets, spastic colitis and other syndromes This is the dangerous type, especially in connection with the epidemiologic aspects of the disease Such cases are the ones who invariably state they are in good health, yet each day they create new victims of the disease

The symptomatology described by various authors is quite involved, among some of those encountered in the various phases of the disease are anemia,[46, 47, 84, 1 7, 10, 223, 3 1] arthritis,[46, 47, 81, 96] *abdominal pain*,[44, 46, 96, 47, 84, 10, 168, 177, 223, 308, 3 1, 3 2] abdominal distention,[46, 47, 177, 210, 3 1] anorexia,[46, 177, 223, 3 1] borborygmus,[147] cephalalgia,[84, 96, 3 1] clubbed fingers,[81] dorsal neuralgia,[84, 96] dysuria,[168] diaphoresis,[44] gaseous eructation,[96, 169, 223] gastro intestinal upsets[46, 4, 105, 10, 223, 308] hemorrhage,[46, 47, 11] indigestion,[3 1] irregular pulse[96, 168] insomnia,[1 7] jaundice,[223] loss of weight,[44, 46, 47, 84, 169, 210, 223] malaise,[44, 84, 210, 3 1] nausea,[84, 168, 177, 223, 321] pyrosis[210] pyrexia,[44, 46, 47, 84, 105, 168, 177, 223, 3 1] rigors,[84, 210, 223, 321] *tenesmus*[46, 47, 84, 210, 2 1, 3 1] *tachycardia*,[96, 223] toxemia,[46, 4, 84, 10, 168, 203, 201] vasomotor disturbances[94] vomiting[46, 47, 168, 223, 3 1] and central nervous system involvement (neurasthenia)[177]

DIAGNOSIS Even though amebic infection may be inferred from a history marked by frequent exacerbations of numerous bloody, fluid stools, rectal tenesmus, abdominal pains and prostration, an absolute *diagnosis can be made only by* demonstrating the motile amebae or cysts in the stools or scrapings from the bases of the ulcers[96, 333] The fact that the organism exists in both the trophozoite (vegetative) and the cystic form adds to the difficulty of diagnosing it, and in addition, partially accounts for the inadequacy of the procedures generally used The trophozoites—those active forms which throw out pseudopodia, absorb nourishment and liberate toxins—are not resistant when exposed to the air and easily perish The cysts however remain viable outside the body for

extended periods, and it is these forms which, if ingested, are the causatives of infection The trophozoite is more easily diagnosed and recognized than is the cystic form [90]

The picture as presented by proctosigmoidoscopy is of value and somewhat characteristic (Fig 236) Hirschman[109] calls attention to the fact that papular spots may be seen with a white or yellow point of necrosis which soon becomes the ulcer Usually the ulcers are discrete and may involve either the upper or lower surfaces of the valves of Houston or a prominent fold of the bowel wall[77] The ulcers are irregular occasionally round or oval with ragged undermined edges and a grayish yellow necrotic base In an early case the surrounding mucous membrane may appear slightly inflamed while later edema and hemor



Fig 235 (A) Amebic dysentery typical patches of infiltration and ulceration (B) Bacillary dysentery (Shiga infection) coagulation necrosis of lower portion of ileum showing characteristic green coloration of the destroyed mucous membrane (P H Manson Bahr Manson s Tropical Diseases London Cassell)

rhagic areas are observed As is usual, the process is diffuse and superimposed by secondary infection so that typical ulcers are seldom seen Since the diagnosis of amebic infection rests solely on the ability to dem



Fig 236 Amebic proctitis Proctoscopic view of preulcerative stage

onstrate the *Endamoeba histolytica* by means of the microscope, much technical skill and experience is required Therefore, the services of one qualified should be obtained for the identification of these organisms and their cysts The sigmoidoscope is no longer an instrument for the use of specialists exclusively It should be employed by any well trained practitioner who with experience and frequent use, will readily differentiate the dry, glistening mucosa with evident blood vessel tracings of a normal case[101] from the congested, purulent edematous bleeding mucosa of a true colitis

EXAMINATION OF SCRAPINGS AND STOOLS

Scrapings Since the majority of these cases are of the ambulant type, the scrapings from the bases of the ulcers may be readily obtained through the sigmoidoscope for examination This is the ideal method[1 0 18 183] Nowadays patients are no longer requested to bring a warm stool because there are too many delays and difficulties involved The only definite and positive method of obtaining an accurate diagnosis is by using the proctoscope, which enables the operator to obtain the specimen warm and taken directly from the lesion in the mucosa Here, the amebae are readily recognized, even without the use of a warm stage microscope, and other parasites and ova may be identified at the same time[101]

Technic With the patient in the inverted or knee chest position, the bases of the ulcers are curetted through the sigmoidoscope using a spooned metal applicator or the edges and suspicious tissue are clipped by means of a specimen taker,' as described by Boeck and Smith Two specimens are taken for examination The one is macerated thoroughly and placed on a clean glass slide containing a few drops of warm physiologic saline solution, and a cover slip is placed over it Under the microscope the amebae may be observed by their clear ectoplasm and granular endoplasm, in which may be seen red blood cells When fresh and warm, the motility of the organisms can be demonstrated, although the nucleus is usually invisible The second specimen is fixed in Zenker s or Schaudinn s solution, sectioned, and stained with hematoxylin and eosin

Stools A saline cathartic, as magnesium sulphate, from ½ to 1 ounce taken the night preceding or the morning of the examination, is advocated where the stools are of solid consistency Mineral oil or castor oil should not be given As a rule only the vegetative form (motile) is demonstrated in liquid or semiliquid stools and blood stained mucus, whereas the cysts are more readily found after the stool is formed[208]

Direct Smears of Fresh Stools The freshly voided stool, having been collected in a clean warm porcelain receptacle, is kept at or near body temperature in order to preserve the motility of the organisms At least two specimens should be examined, one unstained and the other stained D Antoni[10] prefers the following method for diagnosis After sigmoidoscopic examination of the mucosa, material is aspirated from the base of the ulcer and the undermined edges by means of a small glass tube attached to a rubber suction bulb The material thus ob

tained is examined as a direct fecal film, using the zinc sulfate centrifugal flotation technic A portion of the aspirated material may be suspended in physiologic saline to determine the presence of other organisms

The zinc sulfate flotation technic follows

1 A fecal suspension is prepared, using one part stool to 10 parts tap water

2 Strain 10 cc of the suspension through a layer of wet cheesecloth in a small funnel into a Wassermann tube

3 Centrifugalize the tube for one minute at 2,600 r p m Pour off the supernatant fluid and add 2 cc of water the sediment is then broken up by shaking, additional water is then added to fill the tube

4 Repeat the centrifugalization until the supernatant fluid becomes clear Usually this procedure must be repeated three or four times to obtain a clear solution

5 The last supernatant fluid is poured off and 2 cc of zinc sulfate solution, Sp Gr 1 180 (33 3 per cent) is then added The sediment is again broken up and sufficient zinc solution added to fill the tube to within one half inch of the rim Again centrifugalize at top speed for one minute

6 Several wire loopfuls are removed from the surface film and placed on a clean glass slide one drop of D Antoni s iodine stain added and the preparation agitated manually to insure uniform mixture

7 Apply the cover glass and examine microscopically

Unstained Smear Immediately a small bit of feces or blood stained mucus is selected and placed on an ordinary glass slide Should the material be thick a drop or two of physiologic saline solution may be added A cover slip is compressed gently and the specimens are examined under the microscope using a warm mechanical stage[309] Both the vegetative (active or motile) and the cystic (quiescent) phases may be observed The amebae are noted by their clear ectoplasm and granular endoplasm Inclusions of red blood cells may be seen in the latter in which case a diagnosis of infection with the *Endamoeba histolytica* should be made The nuclei are almost invisible

Stained Smears The purpose of staining is to clarify any existing doubt and to present the true characteristics of the vegetative and encysted stages Simon suggests the use of a 0 1 per cent aqueous solution of eosin to differentiate among cellular detritus, vegetable remnants and yeast, since the cysts of the amebae remain unstained For demonstration of the cysts, Donaldson s iodine eosin stain is most reliable,[110] easily applied and quickly performed, though others such as Lugol s, Mann's and Heidenhain s have been used with excellent results Donaldson's stain consists of two parts A 2 per cent iodine and 5 per cent potassium iodide in physiologic salt solution B 10 per cent eosin in physiologic salt solution Ohlmacker [67] suggests placing one drop of each on a glass slide and mixing, after which a small bit of feces or mucus is added and a cover slip applied In this way the amebae and their cysts are rendered visible The cysts take on a pale yellow color against a pink background, whereas the nuclei are stained a yellowish brown

Number of Stool Examinations The value of repeated examinations on several successive days has been opportunely stressed by various clinicians [93] since a score have sometimes been performed before the amebae or their cysts were demonstrated Sumerlin [318] however considers that a single examination will reveal the protozoa in 90 per cent of the cases, if a liquid specimen is collected following a saline cathartic and examined while warm

Macroscopic The presence of numerous large pieces of rosy, blood stained mucus when occurring separately is suggestive of amebic disease

Culture Originally employed in 1925 [7] this method has proved of value yet cannot be considered applicable for routine use Various media are employed especially those devised by Dobell and Laidaw [118] Cleveland and Collier [68] St John [339] and Craig [91] More recently the medium used is a liver infusion in agar with normal human or blood serum [173] The medium is inoculated with fecal material and incubated at 37° C

Although culture technics have been materially improved in the last few years, and as a result have yielded higher percentages of positives, they still remain adjunctive media for diagnosis, in addition, they are much too time consuming to be of more than cursory interest

Craig and Faust[98] stated that "numerous media have been devised for the cultivation of parasitic amebae but it is best to employ a single medium and gain experience with it than to use several with doubtful technic and results The senior author has found that in the cultivation of *E histolytica* the simple liquid media (Locke serum medium and Boeck and Drbohlau's Locke egg serum medium) are sufficient for diagnostic purposes"

Serologic Test Complement Fixation Test The method designed by Craig,[91 9] though satisfactory, is a highly scientific procedure and the antigen difficult of preparation, so that for routine use it is impracticable More recently Tsuchiya[360] presented a test the results of which have been significant and valuable In Craig's hands this method has returned 90 per cent positive results Most workers, however, find the technic more or less difficult, the main fault being preparation of a suitable antigen Research is still in the course of preparing a standardized stable and potent antigen In all probability, the chief reason for this ineffectiveness is its comparison from an identical standpoint with the Wassermann technic the only modification being the use of a different antigen In testing for amebiasis human red cells are used instead of sheep cells and the antigen employed is an alcoholic extract of *E histolytica* cultures or of mucoid material rich in amebae which is obtained from the intestine of infected dogs"[38]

However, the entire method is still in the inceptive stage of experimentation and is unavailable for routine laboratory use Although of definite specificity, the test requires the experience and training of a serologist, and its use is advised only where it is impossible to make stool examinations for the presence of the parasite

In the matter of skin testing, the same difficulty of a suitable antigen obtains here also Even then, it would merely serve as an adjunctive test giving only presumptive evidence either that the individual is an ameba host or that he has amebiasis, which, in the last analysis, means little[101]

ROENTGENOGRAM Roentgenographic study following the administration of an opaque enema has proved unsatisfactory except in a few cases Usually when the bowel lesions are extensive, irregular deformity is noted The procedure should be reserved to determine the extent of involvement and for differential diagnosis[41 151]

BLOOD CHANGES A moderate or marked leukocytosis is present, the latter being most usual Although the red blood cell count is normal or almost normal in the early stages often a severe secondary anemia is noted in the chronic stage

DIFFERENTIAL DIAGNOSIS Differentiation among various forms of proctosigmoiditis may be found on page 283

Distinguishing characteristics of the *Endamoeba histolytica* and the *Endamoeba coli*[90 230] are as follows

	ENDAMOEBA HISTOLYTICA	ENDAMOEBA COLI
	Vegetative Form	
Pathogenesis	Man	Nonpathogenic
Size	20 30 microns	Smaller
Color	Colorless	Greenish
Motility	Explosive movement	Sluggish
Pseudopodia	Finger shaped	Blunt
Inclusions	Red blood cells	None
Nucleus	Invisible	Round or oval, clear coarse ring
	Encysted Form (Stained)	
Shape	Spheroidal	Ovoidal or irregular

	ENDAMOEBA HISTOLYTICA (*Continued*)	ENDAMOEBA COLI (*Continued*)
Size	8 14 μ coarsely vacuolated	Larger and uniformly granular
Cyst wall	Thin	Thick
Nuclei	4 in number, borders highly refractile	8 to 16 borders thin and granular

COMPLICATIONS AND SEQUELAE Perirectal abscesses[168] and fistulae[168] have frequently been observed, as well as fissures [168] hemorrhoids[168] and postanal infection Stricture is of rare occurrence but, when present, is usually due to secondary bacterial infection [6] Hawe[168] reported a case of rectal stricture in a 28 year old male which he described as affecting the upper portion of the anal canal and lower part of the rectum ulceration was present between these areas Adenomatosis is not infrequent with chronic amebic ulceration of the colon [18] Secondary infection of the colon should be considered an important complication Intestinal obstruction[74, 222, 223] may occur from excessive scar tissue formation Postcolic abscess, pericolic abscess [23] appendiceal involvement [10, 168, 265] severe intestinal hemorrhage,[168, 223, 265] perforation of an ulcer in the bowel[168, 265] — usually the sigmoid colon[228]—and peritonitis[168, 265] may also be mentioned The presence of an isolated chronic ulcer which remains persistent with progressive erosion causing amebic granuloma has been reported [165, 223, 7] Polyarthritis has been observed [207] Hepatitis with abscess formation, usually a disastrous complication occurs in approximately 22 per cent of the cases [144, 165, 223, 265] Anorectal abscess [168] cerebral abscess,[164, 223, 1] lung abscess,[223, 265] splenic abscess, [265] pseudomalignancy[168] and malignancy [168, 10] bronchiectasis,[177] hemorrhoids,[168] genito urinary infections [271, 6] intussusception [223] intestinal stenosis[271, 6] perianal ulceration [168] pseudopolyposis [265] subtertian malaria[177] and sigmoidovesical fistula[291] are also mentioned as complicating factors A number of cases have been reported by McConaghey[251] in which skin lesions have been found These have usually occurred in the perianal and anal regions varying from minute ulcers to more extensive ulceration or even gangrene The diagnosis is made by careful histologic examinations

PROGNOSIS In general, the younger the patient and the shorter the duration, the more favorable is the outlook When it is recognized and early and proper treatment instituted, the prognosis is good Untreated cases offer a high mortality rate Multiple abscesses of the liver are of serious import and usually carry an unfavorable prognosis Rogers believes that 95 per cent of cases can be completely and permanently cured of their amebic infection if properly treated for, as he remarks, amebic disease has been removed from one of the most intractable of infections to one nearly always amenable to the specific drug emetine [7]

TREATMENT Prophylaxis consists of those measures by which the dissemination of the cysts outside the body may be controlled They are as follows (1) Disinfection of the feces and their complete disposal under sanitary precautions is imperative Brown advocated mixing the intestinal discharge with an antiseptic such as a compound solution of cresol Exposure to dry heat at 68 degrees C for five minutes is also recommended (2) Safeguarding water and milk by boiling is an important factor when the possibility of infection exists (3) Avoidance of contaminated foods, such as raw fruits and vegetables, by the exclusion and destruction of flies and other insects, and by periodic stool examinations of all food handlers, and (4) Institution of adequate treatment in case of carriers [7]

GENERAL CONSIDERATIONS The general condition of the patient should always be respected Absolute confinement to bed is indicated in the acute stages and the hygienic surroundings are to be given strict attention With the present available knowledge of the relationship of depletion diseases to body chemistry, much can be done

to prevent the extreme emaciation, wasting and dehydration which is the major cause of mortality The diet should be smooth and relatively high in protein and starch content Only water should be taken the first 24 hours, then barley water, broth, egg albumen, tea, rice and milk later, cocoa cereal, chicken, eggs and custards[239, 240] Amino acids per oram, intravenously or intrasternally will supplement the protein intake The use of blood transfusions when necessary and, in addition, blood plasma intravenously are also excellent sources of replacement of protein loss Normal saline, glucose Ringer s solution and small amounts of potassium will replace the electrolyte loss Vitamins, especially the B complex, must be added to the diet or administered parenterally[6, 308] Alcohol is definitely interdicted

During convalescence, care should be taken to avoid chilling and overexertion Mild attacks of diarrhea may occur at times after the disease has been eradicated, the patient should be advised that this might be expected Obviously, frequent stool examinations should continue, but these, in many instances, will show negative results

SYMPTOMATIC THERAPY The course of the acute disease is markedly controlled with modern amebicidal therapy so that symptomatic treatment is not often necessary Diarrhea is often present, however, in the chronic stage of the disease due to increased intestinal ulceration and replacement by scar tissue Nausea and vomiting may be controlled by the use of tannic acid gr ½ to gr 1, in pill form tinct opii M xv cocaine hydrochloride, gr 1/20 to 1/10 atropine sulfate gr 1/300, and gastric lavage Tenesmus may be allayed by instillations of warm starch water, olive oil or the following ℞ as suggested by Fantus

Iodoform	8 0 Gm
Olive oil	90 0 cc

M

Keep on ice and instill one half ounce into rectum every four hours

LOCAL TREATMENT Rectal injections of chiniofon or carbarsone are sometimes employed in treating this entity Two hundred cc of a one per cent solution of the latter medication in a 2 per cent aqueous solution of sodium bicarbonate is slowly instilled into the rectum and retained for as long as possible Use of the former medication is in 2 per cent solution, 200 cc being used at each instillation Bortz[8] makes use of emetine hydrochloride, 1 2500 Many other methods of topical application of various medications have been employed ordinarily applied through the sigmoidoscope at other times by instillation, but the author does not find them beneficial in the light of the present concepts of treatment

CHEMOTHERAPY Treatment of the entity is not confined exclusively to what is known as amebic dysentery" and its well known symptom complex, all types of the disease require treatment, namely

1 Carriers, with or without symptoms
2 Amebic enteritis diarrheal symptoms only
3 Acute or chronic amebic dysentery
4 Complications, such as hepatic abscess of amebic origin, cerebral abscess, amebic appendicitis and granulomas
5 Prophylaxis

Many drugs have been used in the treatment of the disease, many of them possessing specific action It must be emphasized, however, that each of them has definite value only in its selection for a definite disease type As an illustration, treatment of the acute type would not apply to the carrier phase and vice versa

Emetine the alkaloid of ipecac, is the most commonly used and, according to many,[135, 205, 91, 301] is the most valuable Two forms are employed, emetine hydrochloride and emetine bismuth subiodide[193, 293] Generally considered, its greatest field is during the acute stage Emetine may be given orally or hypodermically, the latter method is the more effective A combination of the two has produced excellent results ⅓ gr (0 03 Gm) is given every night by mouth and 1 gr (0 06 Gm) every morning subcutaneously in sterile physi

ologic saline solution This is continued for from 10 to 12 days followed by a period of rest for one month During this treatment the patient should be kept in bed and closely watched, since emetine may produce toxic symptoms if administered in too large dosage or over too long a period In this event diarrhea (often confused with dysentery) increase in pulse rate, muscular weakness especially about the neck,[9] loss of weight and nervous prostration may occur in which case the emetine is discontinued Complications, as peripheral neuritis myocarditis and cardiac death have been reported [7] According to Fantus emetine fails in approximately two thirds of the cases He suggests the use of other drugs on the sixth day of treatment should no improvement be noted

Carbarsone[79] has proved a valuable contribution to the treatment of amebic infections By many[83 110 263 375] it is considered to be the most efficient drug at our disposal today Although an arsenical it is less toxic[140] and therapeutically more active than any of its group

Carbarsone is a white crystalline powder odorless and practically insoluble The drug is administered in gelatin capsules 75 mg per kilogram of body weight The dose for the average adult is 250 mg It is given by mouth daily for 10 days after which 10 days should elapse before a second course is instituted should this be necessary

Retention enemas of carbarsone 2 mg in 200 cc of a 2 per cent sodium bicarbonate solution may be administered every second night after a cleansing enema When enemas are given the drug should not be taken orally

Chiniofon (yatren or anayodin)[163] which chemically is iodoxyquinoline sulphonic acid, is a fine, crystalline yellow powder The preparation may be taken by mouth in doses of from 7½ to 15 grains (0 5 1 Gm) thrice daily before meals for from 8 to 10 days Following a period of rest for 10 days the course is repeated and this program continued until the patient is symptom free and amebae are absent in the stools In pill form, chiniofon may be coated with phenyl salicylate[48 188] Chiniofon by mouth and by rectum has proved effective in some cases For this 7½ grains (0 05 Gm) are given by mouth thrice daily and a retention enema of 45 grains (3 Gm) in 200 cc of warm water is administered each night

Although chiniofon is considered the least effective in comparison with other drugs[1 4] Mackie[230] and others[181 290 314] have obtained excellent results from its use

Vioform iodochlorhydroxyquinoline which is closely related to chiniofon is given by mouth in doses of 0 75 Gm every day for 10 days A recent experimental survey shows vioform to be one of the most efficient amebicides in use today [111 284] It is not to be used rectally because of its irritating effect on the mucosa

Acetarsone (stovarsol)[71 362] like treparsol is an arsenical preparation and is administered in tablet form 0 25 Gm thrice daily for one week It is advisable to chew the tablet with the meal After an interval of a week a second course may be given Complications from the use of this drug have been reported among which are exfoliative dermatitis[6] toxic erythema[1 4] peripheral neuritis[264] and death[61]

Diodoquin is a tasteless, nontoxic compound It possesses a high protozoacidal potency and does not produce unpleasant purgation frequently experienced with other hydroxyquinoline compounds Large doses have been administered over prolonged periods without toxic symptoms We have been particularly impressed with the results obtained by the drug Two tablets, each containing 3 2 grains are administered by mouth every four hours for five doses and for a period of 16 days Following a rest period of two weeks, the drug may be repeated where necessary In only one instance was intolerance observed

D Antoni[104] has arranged the drugs and their characteristics as shown in the table on the following page

1 *Treatment of Carriers with and without Symptoms* Due to the fact that these

TABLE 11

Drug	Preparation	Dosage
Diodoquin[1 4]	Tablets containing 3 2 grains (0 21 grams) iodine compound in which the sodium sulfonate of Chiniofon is replaced by a second iodine atom forming a double iodine compound (5 7 diiodo 8 hydroxyquinoline) containing 63 9% iodine	Adults 22 5 to 32 grains (7 10 tablets) daily for a period of 16 to 20 days Children 1 tablet daily per 15 pounds of body weight
Chiniofon	Keratin coated or uncoated pills containing 4 grains (0 25 grams) sodium iodoxyquinoline sulfonic acid containing 26 to 28% iodine	Adults 16 grains t i d for 7 days Children 1 grain t i d per 10 pounds of body weight
Vioform	Gelatin capsule containing 4 grains (0 25 grams) iodochlorhydroxyquinoline containing between 37 5 and 41 5% iodine	Adults 4 grains t i d for 10 days—twice this dose is recommended for severe cases Children ⅓ grain t i d per 15 pounds of body weight
Carbarsone	Gelatin capsules containing 4 grains (0.25 grams) 4 carbaminophenylarsonic acid containing 28.85% arsenic	Adults 1 capsule b i d for 10 days Children ¼ capsule daily per 20 pounds of body weight
Neoprontosil	Tablets containing 5 grains (0.33 grams) disodium-4 sulfamidophenyl 2 azo 7 acetyl amino 1 hydroxynaphthalene 3 6 disulfonate each tablet containing 1.3 grains sulfanilamide	Adults 5 15 grs (1 3 tablets) t i d for 5 7 days Children 1 gr t i d per 10 pounds of body weight
Emetine	Ampules containing 1 grain of emetine hydrochloride in 1 cc of solution	Adults 1 grain subcutaneously not to exceed 12 grains within a period of 40 days Children (over 8 years of age) must not exceed ⅓ grain daily

patients have either minimal or no symptoms whatever they are usually ambulatory and for this reason are not under constant supervision any medication that is non toxic, therefore is most desirable in treating them Craig[97] was of the opinion that chiniofon possessed greater efficiency in treatment and was the safest form of therapy for this purpose Reed and his co workers[94] believed vioform to be the medication of choice while others preferred diodoquin, which is relatively nontoxic in action As a rule, one course of any of the e medications is sufficient to cause a permanent disappearance of the parasite from the stools but at times a second course is indicated in order that absolute assurance of negativity in findings be reported

2 *Treatment of Amebic Enteritis* Individuals infected with *E histolytica* and presenting symptoms of recurrent diarrhea lasting for several days come under this classification The diarrhea may be minimal at times, the patient being ambulatory and

TABLE 11

APPROX EFFICACY	TOXICITY	UNTOWARD SYMPTOMS	CONTRA INDICATIONS
92 8% with a single course of treatment 99% ultimate effi cacy (5 of 126 cases required a second course of Diodo quin)	Nontoxic in thera peutic do es	None	E entially nil
90%	Nontoxic in thera peutic do es	In about 40% of individuals treated a diarrhea appears on 2nd or 3rd day for 1 or 2 days controlled by 2 drams (8 cc) Tr opii cam phora USP following each defecation	Es entially nil
80%	More toxic than Chiniofon less toxic than Carbarsone	In about 40% of individuals treated a diarrhea appears on 2nd or 3rd day for 1 or 2 days—controlled by 2 drams (8 cc) Tr opii cam phora USP following each defecation	E entially nil
90%	Mildly toxic	If toxic symptoms occur (especially undue intestinal bleeding) medication should be stopped	Liver and kidney disease
50% Drug relieves symptoms of ab dominal distre s and inhibits secondary infection in amebic le ions	In therapeutic doses this drug might cause nausea vomit ing or dizziness	Nau ea vomiting dizziness jaundice urticaria derma titis methemoglobinemia and granulocytopenia	None in thera peutic doses
Relieves symptoms in 85% of ca es curative in only 33% relatively effi cient (only drug available) in liver abscess	Produces nausea or vomiting extremely toxic in large doses or over long period of time produces myocardial damage	Toxic symptoms such as cardiac failure myocarditis wrist ankle or toe drop muscular pains and weakness may appear during injec tion medication must then be stopped	Myocardial kid ney and liver damage children under 8 years of age

treated as a carrier Quite often however, it may be severe enough to require hos pitalization In the latter case emetine hydrochloride[135 70 415 301] is preferred fol lowing which chiniofon [111 163 84] vio form or diodoquin is to be administered as recommended Should stool examinations be reported positive following two courses in treatment of any of the above medications, carbarsone may be used

3 *Treatment of Acute and Chronic Amebic Dysentery* Most investigators have found that emetine hydrochloride gives the most satisfactory results In treating a series of 130 cases Craig (loc cit) noted recurrence in 81 per cent within 40 days of cessation of treatment which led to the conclusion by the author that while emetine is ideal in treating both acute and chronic forms of the entity it must be followed by the administration of adjunct therapy to permanently rid the tissues of the parasite The method of treatment is as follows

A Emetine 1 grain (0 065 Gm), injected

subcutaneously each day until subsidence of dysenteric symptoms the treatment should not be employed beyond the seventh or eighth day as toxic symptoms may intervene

B Diodoquin, vioform chiniofon or a course of carbarsone should then follow, governed by frequent stool examinations[56, 110, 140, 63, 9, 3] Craig et al (loc cit) state that it is best not to adhere too closely to any one drug *where resistance to cure is encountered*, but there should be rotation of other medications one of which might prove to be efficacious Many writers are of the opinion that *diodoquin or chiniofon may be used without* recourse to initial treatment with emetine it is generally agreed however that in the severe types the above routine has given the best results The treatment of chronic amebic dysentery depends upon the stage of the disease encountered when treatment is begun Stovarsal is recommended[147, 36] in dosage of 0 25 Gm t i d for one week Exfoliative dermatitis[6] toxic erythema[1, 4] peripheral neuritis[34] and death[64] have been reported as complications

4 *Treatment of the Complications* Although the treatment of amebic liver abscess is largely considered a surgical problem the early recognition and treatment of amebic hepatitis and abscess development is essentially medical in treatment Rogers and Megaw[30] state that characteristic symptoms of fever leukocytosis and pain in the hepatic region may indicate early abscess formation Emetine should be administered at once in subcutaneous dosage of 1 grain (0 065 mg) daily for a period not exceeding 12 days At the end of one week the febrile condition and concomitant leukocytosis should be absent Failure of this phase to occur means in all probability that suppuration has set in In the presence of abscess formation Rogers and Cassoni believed that emetine should be awarded a fair trial prior to surgical aspiration or drainage is instituted Many writers agree that emetine plus aspiration in cases where an abscess is clearly defined will result in greater rapidity of recovery Some surgeons advocate the open procedure but most of them agree that it should be limited to the following conditions as postulated by Craig

1 If fluid re accumulates despite repeated aspiration

2 Where secondary infection has occurred

3 When an abscess has perforated into the pleural cavity, the supra or infrahepatic space or extraperitoneally

4 Where the abscess has perforated into adjoining viscera becomes secondarily infected, or is inefficiently drained

Other complications such as cerebral abscess, lung abscess, perforation appendicitis or granuloma must be treated initially by emetine as in hepatic abscess, prior to the institution of surgical measures Where an emergency operation is essential the simultaneous use of emetine is indicated It is conceded that, in all cases where emetine is used in treating complications it should be used in conjunction with adjunctive medication

5 *Prophylactic Treatment* It is vitally essential that the search for "carriers' never be relaxed, especially where the disease has assumed epidemic proportions Scrupulous attention to hygiene and protection from food and water contamination are essential precautions where the disease has become manifest Diodoquin or chiniofon possessing the least toxic reactions of amebicidal drugs should be used for short periods where *epidemic conditions are present*

Surgical Treatment Intestinal amebiasis is a disease of major surgical importance in endemic areas With the return of service men from these areas sporadic outbreaks of this disease may be expected in general practice at home

Clinical and radiologic manifestations of the localized forms of intestinal amebiasis may be indistinguishable from either acute or chronic *surgical diseases* Usually but not always it may be possible to find the parasite present in the stools sigmoidoscopy may succeed where examination of the stool fails to reveal their presence The response to emetine is of considerable diagnostic value according to Hawe[168] where the condition present *is resistant to the* drug in this case biopsy or exploration is then indicated The possible coexistence of amebiasis with other lesions must not be overlooked perforation is one of the complications but fortunately this has occurred

in less than 3 per cent of the cases Toxemia may entirely mask the clinical signs, even gangrene being coexistent Recovery, even with surgical intervention, is very unlikely

The clinical features of acute cecal amebiasis and acute appendicitis have much in common The differential diagnosis may present difficulties but, in view of the risk of surgical intervention, every endeavor should be made to obtain a clinical diagnosis Where exploration is deemed necessary, manipulation of the cecum should be avoided and, unless the appendix is obviously in a dangerous position, it should not be removed in the presence of amebiasis but emetine should be administered at once Examples of localized chronic amebic colitis and ulceration of the rectum which may be mistaken for carcinoma or other surgical diseases in endemic areas have been encountered Anorectal conditions such as hemorrhoids fissure and fistulae may be found associated with unsuspected mild or chronic amebiasis With few exceptions surgical procedures are strongly contraindicated in patients having intestinal amebiasis Where operation is necessary or where the presence of amebiasis is encountered during an exploratory procedure emetine therapy should be instituted Appendicostomy or cecostomy appear to have no place from a surgical standpoint in treating this entity

Ochsner and his co workers [6] were of the opinion that the surgical significance of the disease may be underestimated due to its producing intestinal manifestations identical with other bowel lesions amenable to surgery and which cause extra intestinal invasion producing lesions necessitating operative intervention The amebic lesions possessing surgical significance are (1) appendicitis (2) perforation with resulting peritonitis (3) massive hemorrhage (4) ameboma (amebic granuloma) (5) cicatricial stenosis (6) and pseudopolyposis These are classed as the intestinal lesions

The extra intestinal types are (1) hepatic abscess (2) pleuropulmonary infections (3) cerebral abscess (4) cutaneous ulcerations and abscess, (5) splenic abscess, and (6) genito urinary infections

Amebic appendicitis is one of the most frequent complications of the disease and may occur as an acute suppurative or chronic inflammatory process It has been estimated that about 10 per cent of patients with symptoms of chronic appendicitis have an amebic infection of the organ which will respond to antiamebicidal therapy

Perforation with resultant peritonitis is a most serious complication, usually ending fatally unless localization occurs Massive intestinal hemorrhage demands immediate use of emetine together with equally massive blood transfusions Amebic granulomata, usually occurring in the cecum and sigmoid, are very often mistaken for malignancy, tuberculomata or actinomycotic lesions Localized or diffuse cicatricial stenosis may follow prolonged or recurrent bouts of the disease and invariably they necessitate surgical intervention

Of the extra intestinal type of lesions one of the most frequent complications is hepatic abscess this may occur in approximately 5 per cent of all cases The treatment advocated by Ochsner consists of the administration of emetine and surgical aspiration of the abscess contents rather than removal by open drainage

Schistosomiasis

Definition Schistosomiasis (bilharziasis) is a parasitic disease affecting by predilection the portal venous system and especially the lower colon and rectum The disease is characterized by an extended first stage (from 3 to 4 weeks) and is practically asymptomatic There follows an acute second stage with hyperpyrexia of remittent or intermittent type and colicky abdominal pain and distention with severe attacks of diarrhea invariably accompanied by the passage of blood and pus A third or chronic stage ensues in which the liver becomes enlarged and likewise the spleen

Incidence Three recognized types have been demonstrated according to Warner [377] The only distinguishing feature about them

subcutaneously each day until subsidence of dysenteric symptoms the treatment should not be employed beyond the seventh or eighth day, as toxic symptoms may intervene

B Diodoquin, vioform, chiniofon, or a course of carbarsone should then follow, governed by frequent stool examinations[80, 110, 140, 63, 9, 37] Craig et al (loc cit) state that it is best not to adhere too closely to any one drug where resistance to cure is encountered but there should be rotation of other medications, one of which might prove to be efficacious Many writers are of the opinion that diodoquin or chiniofon may be used without recourse to initial treatment with emetine it is generally agreed, however, that in the severe types the above routine has given the best results The treatment of chronic amebic dysentery depends upon the stage of the disease encountered when treatment is begun Stovarsal is recommended[71, 36] in dosage of 0 25 Gm t i d for one week Exfoliative dermatitis[6] toxic erythema[1, 4] peripheral neuritis[4] and death[64] have been reported as complications

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cannot be tolerated, emetine has been substituted with from fair to good results Splenectomy is indicated in the presence of a marked ascites

Bacillary Proctosigmoiditis

Bacillary dysentery is an infectious disease caused by the *Bacterium dysenteriae* and characterized pathologically by ulcerations of the mucous membrane of the intestine especially the colon and rectum and clinically by its acute onset intestinal colic watery diarrhea discharge of blood stained mucus and tenesmus Although usually epidemic it may be either endemic or sporadic[193 to 300]

Incidence Although bacillary dysentery is more prevalent in tropical areas[3 178 ...] it is not as frequent in the United States as one would believe Children are more prone to contract the disease than adults of whom the males about equal the females in proportion this ratio also obtains for children Although the predominant incidence is found among Negroes this in all probability is due to insanitary living conditions During the late war it was postulated that the dysenteries and diarrheas together with food poisoning resulted in these entities assuming second place in diseases attacking overseas troops During 1943 this rate was 50 per thousand of hospitalized cases Many cases were reported from army camps in the United States The Bureau of Vital Statistics, Department of Commerce, has noted a rising incidence of mortalities from bacillary dysentery, while the curve for typhoid has fallen steadily Chesley and Woolsey[93] have recently studied the incidence relevant to the disease, as has D Antoni, the former investigators working in Chicago and the latter in New Orleans In both of these cities the *Shigella* type of organism was a predominant factor in the outbreaks in the Chicago area a seven per cent mortality was noted in a review of the causes of death

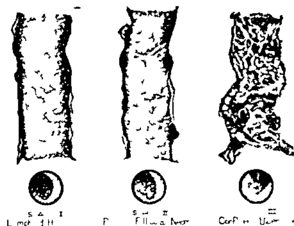


Fig 237 Focal lymphoid necrosis with superficial ulceration Diagrammatic sketches showing transition stage 2 from acute bacillary dysentery to chronic distal ileitis, chronic ulcerative colitis and nonspecific granuloma (Felsen J in Portis S Diseases of the Digestive System Philadelphia Lea & Febiger 1941)

Etiology Inefficient sanitation may be regarded as a predisposing cause of bacillary dysentery Institutions and camps[29?] especially where the personal hygiene is difficult to control, may favor the disease The source of infection is the feces of dysenteric patients and healthy or convalescent carriers Dissemination by flies having access to dysenteric stools and ingestion of food and water contaminated by infected hands are direct means of propagation In the United States direct contagion is rare except through undiagnosed patients with acute abdominal symptoms Hot weather with incidental spoilage of food in the homes of the poorer classes due to lack of refrigeration and a tendency to indiscriminate eating by children have been causative factors in the Chicago area

Bacteriology The dysentery bacillus which is gram negative was originally iso-

is their geographic distribution The Manson type is encountered in the West Indies, South America and Africa, the Japonica type[3] is indigenous to the Philippines, Japan and China,[18] while the hematobium variety is widely distributed in Africa, the Near East and the Mediterranean areas The ease of transmission is easily demonstrated by the fact that in excess of 1,000 cases alone were treated following the invasion of Leyte in the Philippines by United States forces during 1944 This occurred despite all efforts for prevention[74]

Etiology The parasite belongs to the class Trematodes whose life cycle begins in the fresh water snail It is acquired by man from wading or bathing in infested waters in which the fork tailed larvae of the parasite circulate, having escaped from their primary host, the snail The snail has been previously infected by the ciliated larvae which had been hatched from ova from a mammalian host's stools which contaminated the water The larva actually penetrates the skin and gains ingress into the circulation

Parasitology The fork tailed larvae (metacercaria) bore and digest their way through the skin, subsequently gaining entrance into the circulation where they are passively transported through the right heart to the pulmonary arterioles they then squeeze their way through the capillary network enter the venules and thence proceed through the left heart into the arterial distribution Only those larvae survive which reach the mesenteric artery, thence going through the capillaries to the portal circulation where they deposit themselves mainly in the lower colonic and rectal tributaries[133, 310] Here they copulate, the resultant ova being deposited in the submucous venules and due to ulcerative processes they reach the intestinal lumen whence they may be recovered from the stool

Pathology Microscopically a pseudo tubercle reaction is demonstrated in the colonic submucosa which is typical of the infestation Lymphocytes, monocytes and eosinophils form a halo about the primordial tubercle As the disease progresses, fibroplastic infiltration about the irritant reaction results in nodular formation and marked fibrosis Over an extended period, extensive fibrosis of the colonic submucosa and portal spaces results in proctocolitis with portal cirrhosis and splenomegaly

Symptomatology In the primary stage, urticaria and pruritic red papules may be evidenced From six to eight weeks following invasion, fever, abdominal colic and a toxic diarrhea usually develop Six or eight weeks later, attacks of dysentery occur with marked colicky pain and the passage of blood, mucus and ova with the stool Both the liver and spleen become tender and progressively enlarge Leukocytosis and eosinophilia are invariable blood findings

Diagnosis Ova possessing characteristic lateral spines are found in the stools or are recovered from direct smears taken from a mucosal swab A complement fixation test will be positive A thickened and papillomatous mucosa is present with excessive amount of mucus, sometimes a hemorrhage occurs, and ulceration is invariably demonstrated on sigmoidoscopy

Treatment Tartar emetic (antimony and potassium tartrate) is found to be effective in treatment, administered intravenously in a one or two per cent physiologic saline solution Thirty two milligrams are administered every other day, increasing each successive dose by 32 mg with a maximum of from 0 13 to 0 16 gm Injections are continued until a total dose of from 1 6 to 2 0 Gm have been given Patients should be made to lie down for one hour following the injection The drug is contraindicated in the presence of serious cardiac pulmonary or hepatic disorders Fuadin is less effective but more easily tolerated Administered intramuscularly in seven per cent solution, the primary dose is 1 5 cc the following day, 3 5 cc, and the third day, 5 0 cc Thereafter, 5 0 cc are injected every second day for seven days Where antimony

PLATE 3



Sigmoidoscopic appearance of bacillary dysentery in a stage of acute infection Superficial necrosis of the mucosa has occurred and patches of dead mucous membrane are in process of separation Healing takes place by proliferation of the remaining islets of healthy mucosa which finally cover the denuded areas Should necrosis be more extensive complete resolution does not occur and chronic colitis ensues (Royal Society of Tropical Medicine and Hygiene and Butterworth and Co London)

lated by Shiga[110] and is the specific causative factor of the disease entity. Numerous strains have been described since the original discovery,[11, 146, 171, 31] and although *their cultural characteristics vary*, specific antiserum agglutination tests effectively demonstrate the strain involved. (See Chart 12, p. 281.)

Pathology. As a result of the organism gaining entrance to the body by way of the mouth, the organisms produce lesions in the large intestine, of which the sigmoid colon and rectum show the most severe degree of inflammation. There is a characteristic three-stage progression of intestinal pathology, viz., punctate, follicular hyperplasia, punctate follicular necrosis, and a *discrete and confluent ulceration*. The stages are usually one day apart in their progression. Initially, the process is catarrhal in character and usually affects the folds or ridges of the mucous membrane. As a result of coagulation necrosis and the fibrinous exudate, an opaque pseudomembrane is formed which, when cast off, leaves a denuded area. The ulcers which ensue are of variable size and they may become confluent and have a tendency to invade healthy tissue. Involvement is usually confined to the mucous membrane and submucosa, yet the muscular layer of the bowel may become affected. The edges of the ulcer are often sharp, the base being shallow and of brownish color. Between the ulcerated and denuded areas the mucosa appears swollen, congested and covered in part with pus or fibrin.[45]

Symptoms. Following an incubation period of from three to five days, the disease, which is usually of sudden onset, begins with pain and diarrhea. In some cases *the symptoms may be ushered in by* an initial chill followed by a rise in temperature. The abdominal pain is colicky in character and occurs within a period from the first 24 to 48 hours. As the rectal mucosa becomes involved, which occurs early in the disease, an urgent desire for stool *develops*. As a result of continued and in*effective* straining, severe tenesmus ensues.

Diarrhea is a constant symptom, consisting of numerous watery evacuations *(from* 6 to 30 per day) mixed with mucus, pus and blood. Usually, large pieces of necrotic tis*sue are present*. Constitutional symptoms such as loss of appetite, headache, weakness, muscular pain and even delirium develop as the result of the toxemia in virulent cases (toxic psychosis).

Diagnosis. *A positive* diagnosis of bacillary dysentery can be made solely by bacteriologic examination of the stool and a positive agglutination reaction with the patient's serum. A history of sudden onset, with colicky pains over the sigmoid, tenesmus, numerous diarrheic stools mixed with mucus, pus and blood, is suggestive of a *dysenteric process*, but *is* by *no means* pathognomonic of the bacillary disease. Mention has been made that the character of the stool is viscid, containing white of egglike mucus, but, except as a guide, this description is unreliable.

On proctosigmoidoscopy, the ulcers appear somewhat superficial and confined *to* the most part to *the folds or ridges of the* mucosa. The edges of the ulcers are usually sharp, at times undermined; the base is shallow and brown in color. Scattered over the mucosal surface may be seen grayish yellow plaques of necrotic membrane which, when wiped clean with an applicator, leave a raw, bleeding area. Material obtained by *this method and also from the base* of the ulcers is ideal for microscopic examination and culture. Another excellent method for obtaining material is to aspirate *the mu*cosal exudate by means of a capillary glass tube attached to a rubber suction bulb. Following collection of the material, it is sprayed on the culture media and a cover slip is applied for direct examination.

General findings, as abdominal tenderness, especially in the left lower quadrant and *elevated temperature of the remittent* type are invariably present.

Microscopic Examination. A portion of the aspirated material, scrapings *or* fresh stool is selected and placed on a cover slip stained with one of the basic dyes and

examined under the microscope The organism cannot be identified by this method, but increased numbers of columnar epithelial and polynuclear pus cells, the latter showing degenerative changes are suggestive of bacillary infection [101, 1 0] It should be understood that the diagnosis is not absolute by this method yet it is useful in mild cases in which the organisms are difficult to isolate[7] and in the first few days of the disease when the agglutination test is useless [200, 3 1]

BACTERIOLOGIC EXAMINATION The aspirated material or scrapings from the ulcer base or a portion of the mucoid material[201] of the fresh stool are plated on Endo s medium incubated for 24 hours[197] and examined for colorless colonies The biochemical characteristics are determined after which identification is made by the agglutination test Although this method offers an exact means of diagnosis positive cultures are seldom obtained after a lapse of from 10 to 15 days [134]

SEROLOGIC REACTION The agglutination test is absolute after the first few days of the disease at which time the agglutinins are present in the blood stream The procedure consists of testing the blood serum of the patient with (standard) specific sera, agglutination in dilution of 1 100 constituting a positive test

BLOOD COUNT In bacillary dysentery the blood changes are almost nil A slight leukocytosis may be present which seldom exceeds from 12 000 to 15 000 cells In the chronic type a moderate secondary anemia may be noted, as shown by a proportionate decrease in the erythrocyte curve and hemoglobin percentages

DIFFERENTIAL DIAGNOSIS Bacillary dysentery may be confused with the amebic chronic ulcerative tuberculous gonococcic and luetic infections The distinguishing features are noted in the chart (see p 282 Table 13)

COMPLICATIONS Perforation of the bowel with peritonitis is probably the most important complication but fortunately it is uncommon Perirectal abscesses and fistulae may occur Other conditions supervening may be arthritis endocarditis [231] polyneuritis hepatic abscess and pulmonary involvement [234]

TREATMENT PROPHYLAXIS Prophylaxis

TABLE 12 DIFFERENTIATION OF THE DYSENTERY BACILLI
(Topley and Wilson)

	Shiga Kruse	Schmitz	New Castle	Flexner	Alkalescens	Sonne Duval	Dispar
Glucose	A*	A	Ag	A	A	A	A
Mannitol	—	—	A±	A	A	A	A
Lactose	—	—	—	—	—	A late	A late
Sucrose	—	—	—	A±	—	A late	A late
Dulcitol	—	—	Ag late	—	A	—	—
Rhamnose	—	A	?	A±	A	—	A
Xylose	—	—	Sl* A±	—	A	—	A
Sorbitol	—	A±	—	A±	A	—	A
Litmus milk	Sl A	Sl A	Sl A Sl Alk	Sl A Sl Alk	Alk	A late clot	A late clot
Indole	—	+	—	±	+	—	+
Methyl red	—	—	+	±	+	—	+
Catalase	—	+	?	—	+	+	+
Agg antiserum SK	+	—	—	—	—	—	—
Agg antiserum Sch	—	+	—	—	—	—	—
Agg antiserum N	—	—	+	—	—	—	—
Agg antiserum F	—	—	—	+	—	—	—
Agg antiserum Alk	—	—	—	—	+	—	—
Agg antiserum SD	—	—	—	—	—	+	—
Agg antiserum Di	—	—	—	—	—	—	+
Toxicity rabbit		V*	±	+	—	+	+

* A—acid Sl—slight V—variable

consists of isolation of the patient and a thorough disinfection of the excreta containing the specific organisms Drinking water should be boiled and improper or contaminated foods avoided Absolute rest in bed is imperative during the acute stage It is advisable in all cases to purge the patient initially with castor oil magnesium or sodium sulfate[178] The diet should be bland and one easily assimilated consisting of boiled milk, whey, rice strained gruels egg albumen, animal broths of lamb or beef and chicken broth Later, puree and scraped beef may be included, as well as custards, jellies and wines

LOCAL TREATMENT The local use of medication either topically applied through the sigmoidoscope or used as instillations or cleansing enemata has little scientific basis on which to place the treatment of acute bacillary dysentery It is to be remembered that the intestinal lesions which are ulcerated as the result of trauma incident to the disease should be treated as a cellulitis occurring elsewhere This demands free drainage and noninterference with the local body defense mechanisms Numerous preparations have been suggested such as silver nitrate solution from 1 5 000 to 1 1 000 potassium permanganate 1 5 000 tannic acid 1 100 thymol 1 500 alum, 1 100 warm oil mucilage of starch ichthyol, 25 per cent aqueous solution, and that suggested by De Rivas[79] and consisting of copper sulfate 1 5 000 to which is added from 0 5 to 1 0 dram of laudanum per liter The application of neoprontosil solution has been suggested as specific local treatment Bismuth and kaolin with or without the use of opium per oram has been used to allay attacks of tenesmus

SPECIFIC THERAPY—THE SULFONAMIDES Specific treatment of the disease has been greatly enhanced by use of the sulfonamides They have been found to eliminate the bacilli and their toxins a distinct gain in modifying the severity of an attack At the onset of treatment a single dose of castor oil is recommended by Fel en[14] He feels that the diarrhea produced by the infection is a compensatory body defense mechanism and that the acute phase of the disease may be shortened by initiating catharsis at onset of the first symptoms Manson Bahr[11] and Mitchell also concurred in this type of treatment Two general types of the sulfonamides are used, differing in the degree of their absorbability from the intestinal tract Sulfathiazole and sulfadiazine are the two most commonly used, due to the ease of their absorption with optimum blood levels of concentration sufficient to counteract effectively both the organism and the toxin present in the tract Sulfaguanidine and succinylsulfathiazole[280] possess poor absorptive qualities and, as a result, a low level of concentration is present in the blood stream Some investigators[159, 200, 3, 4] have found blood level concentrations of from 1 5 to 10 mg per cent of sulfaguanidine within three days when normal dosages have been administered during treatment of various types of ulcerative colitis Firor[143] has demonstrated that sulfaguanidine is absorbed in the small intestine and he attributed the low blood level concentration to rapid elimination from the kidney It would follow, then that it is wise to take frequent readings of blood level concentrations even where the poorer types of the drug in terms of absorptive power are prescribed Hardy et al[168, 167] found that sulfaguanidine sulfasuxidine sulfadiazine and sulfathiazole all modified the course of the disease, although sulfadiazine and sulfathiazole appeared to possess the advantage in the treatment of the acute forms of the disease Both carriers and convalescents, however reacted best to sulfasuxidine and sulfaguanidine

Shaugnessy and his co workers[318] have recently shown the clinical effectiveness of sulfadiazine in experimentally induced human bacillary dysentery in one hundred thirty one volunteers It not only controlled the disease itself but effectively suppressed the carrier state Poth et al[60] have successfully treated this entity by using succinyl

Table 13 Differential Diagnosis of Specific Proctosigmoiditis

	Amebic	Bacillary	Chronic Ulcerative	Tuberculous Ulcerative	Hyperplastic	Gonococcic	Luetic
Etiology	*Endamoeba histolytica*	*B dysenteriae*	Diplostreptococcus	Tubercle B	Tubercle B	Gonococcus	*Treponema pallidum*
Histologic location	Submucosa	Mucosa	All layers	Submucosa	Submucosa	Mucosa	Submucosa
Manifested	Primary	Primary	Primary	Secondary	Primary	Primary	Secondary
Onset	Insidious (x)*	Acute	Chronic with acute exacerbations	Chronic	Chronic	Acute	Chronic
Age	20 35	Under 35 (x)	20 40	20 40	20 30	20 35	30 40
Fever	Present if acute or complicated	Always present	Slight or moderate	Slight	None	Slight	None
Ulceration	Frequent ulcers are troughlike base deep and yellowish gray edges irregular raised and indurated located on prominent folds of bowel wall or on valves of Houston	Not characteristic ulcers usually superficial edges sharp base brown in color and shallow	Ulcers of small size and numerous	Ulcers shape oval or elliptical usually transverse to long axis of gut base gray, elevated with yellow tubercles edges undermined	Infrequent	Occasional	Ulcers punched out or craterlike base leathery edges sharply defined
Surrounding mucosa	Inflamed	Normal	Diffusely inflamed and granular				
Prostration	Marked	Slight or moderate	Marked during acute phase	Secondarily marked	Slight	None	None
Laboratory	Amebae and cysts in stools and scrapings	*B dysenteriae* in stools and scrapings agglutination of blood serum	Diplostreptococci isolated from bases of rectal ulcers	Tubercle bacilli in scrapings and stools serial sections by guinea pig inoculation	Tubercle bacilli in tissue	Gonococci in smears	Positive Wassermann Kahn, Kolmer spirochete rarely demonstrated by dark field illumination
Roentgenogram after opaque enema	Usually unsatisfactory irregular deformity if process is extensive		Hypermotility contour smooth with loss of haustrations occasionally appears feathery or fringed	Hypermotility and filling defects			
Treatment	Responds to specific measures	Responds to antidysenteric serum sulfathalidine and sulfadiazine*	See Treatment			Responds readily to local treatment	Responds somewhat to antisyphilitic treatment

* (x) = usually

immunized with the Shiga, Flexner, Sonne, Duval and Hiss Strong types of bacilli, the serum being administered in from 10 to 100 cc dosage (average 50 cc) intramuscularly once or twice a day [1,0] In the severe types the serum may be administered intravenously in 10 cc doses every second day, while in the milder types it may be injected into the rectum Subcutaneous methods of administration have been advocated by Felsen[11] in treating infants, using the concentrated lyophil plasma or the serum in a dosage of 25 cc once or twice daily In severe cases, the serum can be administered intravenously for rapidity of absorption It is to be remembered that many persons are sensitive to horse serum and reactions have occurred scratch tests should be done prior to administration (0 2 cc of a 1 10 dilution intradermally) The serum is to be administered slowly giving from 40 to 80 cc of polyvalent antiserum intravenously, followed by 150 cc of physiologic saline for two or three days For children from twenty to fifty cc have been used in mild cases [1]

In order that the severity of anaphylactic reactions be kept in mind even in administering scratch tests the following case is detailed in brief

A six year-old child had been tested for horse serum sensitivity by the injection of 0 05 ml intracutaneously Twenty days prior to this the child had received an injection of diphtheria toxin antitoxin Two minutes following the test dose of diluted serum a large localized wheal developed at the site of injection urticaria developing on the face and trunk Despite administration of adrenalin subcutaneously and directly into the heart muscle the child was dead eight minutes following administration of the test dose [1,0]

Convalescent human serum (third week) from cases in an epidemic area is exceedingly beneficial as a monovalent type specific human serum and has been found to be especially effective under epidemic conditions However, it is wise to pool the sera in order to obviate reactions when the sera are administered intravenously The dosage recommended is from 100 to 200 cc

Bacteriophage used in mild or moderately severe cases early in the course of the disease has proved beneficial when used against the susceptible strains of the organisms It is ineffective, however, after the disease has become well established

Penicillin From the collected evidence available, the use of this medication may be justified in treating the acute or chronic forms of bacillary dysentery The same statement may be made for *streptomycin* but sufficient data for their proper evaluation has yet to be forthcoming

Chronic Ulcerative Proctocolitis

Based on various experimental investigations, this treatise refers to a morbid condition separate and distinct from other forms of rectocolonic ulceration

Definition Chronic ulcerative proctocolitis or thrombo ulcerative proctocolitis is an inflammatory disease of the large bowel characterized pathologically by a typical change in the intestinal wall and clinically by its progressive course and the passage of frequent bloody, mucopurulent discharges [1, 27, 27, 123, 1, 1[illegible], 1[illegible]8, 154, 180, 1] Even though isolated segments of the colon may become involved the fact that approximately 95 per cent [1, 13, 15] of these cases begins in the rectum is of especial interest

Incidence As to sex, chronic ulcerative proctocolitis is more common in men than in women [1,5] while the greatest incidence is observed between the ages of 20 and 40

Etiology The fact that the large bowel is the site of various affections makes this disease—chronic ulcerative colitis—the subject of much controversy as to its etiology the specific cause is still a moot question

Under predisposing causes avitaminosis [1, 7, 15] various infections of the upper respiratory tract such as tonsillitis, rhinitis infected teeth influenza pneumonia and bronchitis are to be mentioned

It should be metioned that the specificity of Bargen s diplostreptococcus has not been generally accepted although some workers have corroborated his findings by demonstrating the organism in many instances [1, 23, 28, 43, 73, 114, 13[illegible], 147, [illegible], 291, [illegible]]

sulfathiazole, which included a large group of children. They believed that the response to the drug is immediate even though the disease may have been present for an extended period prior to inception of treatment. They found sulfaguanidine to be most effective where its use was begun during the first three days of the disease. Lyon,[233] and Marshall and his co-workers concurred in this.[244] Recently, evidence has been presented showing that a combination of the readily absorbable and relatively nonabsorbable drugs may result in greater benefit than where either were used alone. Both sulfadiazine and sulfasuxidine appear to possess increased synergistic properties.

Dosage. According to some investigators, *there is lack of relationship between* dosage and clinical effectiveness produced in sulfonamide administration. The following list of dosage levels and the writers advocating it has been compiled from recent *literature.* *Shaughnessy,*[318] *sulfadiazine ad*ministered one grain for each pound of body weight as a daily dose divided into from 4 to 5 doses and continued for a period of seven days. Hardy,[164] same drug 4 Gm daily for adults, administered for seven days unless the individual has two consecutive negative cultures reported prior to the end of the period. Marshall and his assistants[244] administer sulfaguanidine in the dosage of 0.1 Gm per *kilo of body* weight as an initial dose, then 0.05 Gm per kilo every four hours until the number of evacuations are four or less per day, then the same dosage every eight hours for at least *three additional days.* *Lyon et al.*[233] prescribe 0.1 Gm of the drug per kilo of body weight for the first dose and decreasing the amount to 0.05 Gm every four hours for three days, then the same amount every eight hours *for two additional days.*

The average dose of sulfathiazole used by the majority of writers is two grains per pound of body weight as a primary dose followed by the same amount but divided into *four doses* as a daily maintenance dose which is administered for from four to six days. Taylor[343] suggests the following dosage of sulfathiazole for infants: one gram per year of age up to and including three years, as an initial dose, followed by administration of the same amount daily but divided into six equal portions and these used over a period of five days. Fror[143] advises an average daily dosage of sulfasuxidine of 0.25 Gm per kilo of body weight divided into six doses administered at four-hour intervals. The amount is doubled in cases having severe diarrhea. The drug is one of the least absorbable of all the sulfonamides, only five per cent of the drug being recovered from the urine. In the presence of excessive diarrhea or the administration of mineral oil, its efficacy is definitely reduced. In connection with the *recent combining of both easily absorbable* and poorly absorbable sulfonamides, Felsen[147] suggested the following therapy for adults having acute bacillary dysentery:

Drug	In First 4 Hours After Onset	Every 4 Hours Thereafter	Total Dosage First 24 Hours
Sulfathiazole or Sulfadiazine plus Sulfasuxidine	4 Gm plus 4 Gm	1 Gm plus 1 Gm	9 Gm plus 9 Gm

1. Dosage: 0.25 Gm per kilo of body weight.
2. Start administration as early as possible.
3. Continue medication for at least 3 days after signs and symptoms have subsided.
4. Discontinue drug immediately in presence of renal or toxic manifestations.
5. Check healing by sigmoidoscopy.
6. Check infectivity by cultures on the 10th, 12th and 14th days of the disease, then weekly for a period of one month.

Antiserum. In the form of a polyvalent type, antiserum is both reliable and specific in treatment.[159] It is generally conceded that its value is due to the neutralization of absorbable body toxins of a specific nature. Topley and Wilson[3] suggested that there may exist an antibacterial, rather than an antitoxic action; however, most investigators believe in the latter phase of action. The serum is obtained from horses

cases, among whom they found 41 per cent with marked deficiency Strauss[111] and Castle[77] have described the relationship of dietary deficiency diseases to the gastro intestinal tract

Lium and Porter[1] by means of colonic explants in dogs, demonstrated that colonic spasm due to local irritative action or to changes in the sympathetic parasympathetic balance will actually produce the same pathologic changes as ulcerative colitis The fact that the rectum contracts the most due to increased muscle structure appears to support this evidence, in that it is an accepted tenet that 95 per cent of the cases begin in the rectum

Gill[1 6] has asserted that the causative factor of chronic ulcerative colitis in some cases may lie in a deficiency brought about by the lack of some factor produced by the small intestine Treatment along these lines using strips of jejunal mucosa has given promising results

Psychogenic Factors Nearly two decades ago Murray[393] observed a well marked time relation between the outbreak of an emotional disturbance and the onset of the symptoms of ulcerative colitis Numerous articles[383 384 38] have since been published, all tending to show that certain characteristics are commonly found in patients suffering from this disease Wittkower,[397] for example deduced that the majority of patients with ulcerative colitis presented psychogenic abnormalities Hostility was found to be a frequent trait according to Daniels[398] who believed the underlying reaction to be psychotic rather than psychoneurotic in character

In an effort to recognize the possible etiologic significance of abnormal patterns in personality a number of our patients with chronic ulcerative colitis were evaluated psychiatrically and psychotherapy was instituted While a few were un co operative and perhaps did not continue the prolonged treatment required, the results achieved in the majority of instances were entirely unsatisfactory The writer is of the opinion that slightly more than a dozen cases is not a representative group on which to base a conclusion he feels that further and more extensive evaluation should be instituted in order to determine the significance of psychogenic disturbances One is compelled to concur with Crohn[401] that 'bringing a psychiatrist to the bedside of a toxic, febrile individual has always in my experience been a wastage of time energy and good thought'

Pathology The left colon and rectum are the parts most frequently involved The bowel wall is the site of a diffuse inflammation, while scattered here and there are minute abscesses which, due to pressure necrosis, break down and become confluent to form large, shaggy ulcers These ulcerations may be so extensive in severe cases that very little mucosa remains In those of lesser severity, the mucous membrane appears granular, bleeding easily Usually marked thickening of the various coats is noted, although subsequent narrowing the result of fibrous tissue infiltration, is not too uncommon

Polypoid growths of varying sizes and shapes are observed frequently studding the mucosa Quite properly, they are described as pseudopolyps because of their inflammatory nature

Symptoms In the main, the symptoms of chronic ulcerative proctocolitis are frequent rectal discharges, tenesmus abdominal pain and general lassitude Usually the patient will report attacks of diarrhea, alternating at times with constipation The discharges are bloody mucopurulent and sometimes admixed with fecal matter Many of these patients, aside from their fecal movements often discharge purulent material unmixed with feces Early in the disease, due to rectal involvement, these discharges are accompanied by severe attacks of tenesmus but as the process extends upward into the colon the stools become liquid or mushy, and varying degrees of abdominal cramps are experienced by the patient Constitutional symptoms

[303 331] The investigations of Bargen show that, in many instances, the diplostreptococcus is the prominent etiologic factor This is based on the ability of the author to isolate the organism from the bases of rectal ulcers in 80 per cent of his patients, and in the blood stream of those suffering acutely from the disease[16] Similar findings were noted at necropsy To substantiate his observations, Bargen produced identical lesions in 65 per cent of the animals which had been injected intravenously with cultures of the organism in question As additional evidence that the disease is of specific etiology, Rogers[293] has obtained negative skin tests, after treatment with Bargen's concentrated serum in cases which were previously reported positive As to the bacteriology, Bargen gave a description of this organism as being delicate, lancet shaped and of Gram positive characteristics closely resembling the pneumococcus[13] It occurs in groups of from two to four, produces greening" on blood agar and is occasionally encapsulated

As to the bacterial influence, many organisms have been isolated by different observers, each of whom attaches some significance to his discovery Rolleston, for instance following observation of the pneumococcus, mentions it as a causative agent of chronic ulcerative colitis Bassler, in like manner believed that the B coli was an important factor,[39 1-4] while later he felt that this organism developed virulence under certain conditions[37] In 1927, he gave as his opinion that, although the majority of cases were due to the *B coli* some were brought about by the diplostreptococcus Still later, this investigator[38] stated that chronic ulcerative colitis was caused by three factors (1) infective organisms, (2) lack of local and general resistance and ( ) food deficiency Torrey,[3 8] however, remarks "There is no convincing experimental evidence that the *B coli* is of primary significance in the ulcerative process' Further, he believed that the essential micro organism is a streptococcus and reports "a distinctly different hemolytic streptococcus may be the cause of these lesions This is not unlike the observations of Nesbit,[272] who refers to transition or transmutation in which the colonies of Gram positive diplococci later become colonies of hemolytic streptococci[70] Torrey[3 9] feels that Bargen s diplococcus represents a strain of the streptococcus group Yeomans[3 5] concurs in this hypothesis because his cultures have failed to yield the diplostreptococcus described by Bargen

Thorlakson[3 1] offers what he believes to be confirmatory and therapeutic evidence in support of the contention that the *B dysenteriae* is the causative agent in these cases and considers the presence of Bargen s organism as due to secondary contamination Others concur with this[43 107 235] Bargen and Copeland[23] on the other hand were unable to isolate any organisms simulating those of dysentery Rolleston[303] and Kendall[196] expressed the opinion that the organisms normally present in the intestine may, under certain conditions, exert a pathogenic influence

Paulsen[73 ?] and Brown do not accept as conclusive evidence the specificity of Bargen's organism but are inclined to consider the disease as one of idiopathic origin McCarrison[20] mentions various metabolic disturbances and vitamin deficiencies, the latter termed "avitaminosis" by Davis, as probable causes, which view is supported by Mackie[235] and others[99 113 03] H T Kelly believes that a B complex deficiency is an important factor That such do play an important role in the production of rectocolonic ulceration is undoubtedly true since animal experimentation has proved it[3 7] Yet, in all cases, this cannot be considered directly as the specific cause of the typical morbid condition described Felsen[14] has proved by factual evidence the relation of segmental colitis, bacillary dysentery and chronic ulcerative colitis The role played by vitamin A deficiency has been shown by Lerner and Rapaport[18] by means of biophotometric studies on 30

Calves brains
Chipped calcium carbonate

Dissolve the salt and the bactonutrient broth in the water by heating slightly Add the indicator and glucose and tube in tall tubes (8 x ⅝) filling the tubes half full To each tube add a few small pieces of calves brains and calcium carbonate and stopper with a cotton plug Sterilize in autoclave 20 minutes at 20 pounds pressure

It is vitally necessary that this procedure be followed with meticulous precision as in the author's personal experiences many failures resulted in an attempt to demonstrate the presence of the diplostreptococcus To some degree no doubt this has been due to faulty bacteriologic technic and improper or careless removal of the specimen for examination Some significance is placed upon the character of the discharges On gross appearance the contents are liquid or semiliquid in consistency and contain very little fecal material There is however a preponderance of pus usually streaked with mucus but intimately mixed with blood in varying amounts

Roentgen Examination Roentgen study following barium enema is invaluable in chronic ulcerative proctocolitis where involvement occurs above the pelvic brim According to some writers[7, 19] it is definitely pathognomonic Whereas only a hyperirritability is observed during the early stages of infection, a definite change occurs later, the degree of which is not always proportional to the extent and severity of the disease The contour of the bowel is often smooth and narrow with loss of normal haustrations while later in the process the outline of the bowel appears

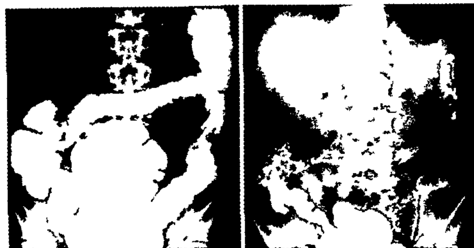


FIG 239 (*Left*) Chronic ulcerative proctocolitis Roentgenogram showing contraction marginal feathering and loss of normal haustrations (*Right*) Roentgenogram after double contrast enema Same case

feathery or fringed[1] (Fig 239) Later still in cases of long duration the so called lead pipe colon (Stierlin's sign) may be produced, due to the deposition of fibrous tissue in the soft pliable layers of the bowel

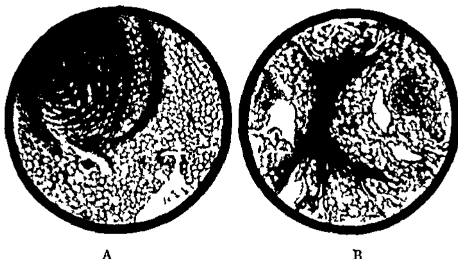
DIFFERENTIAL DIAGNOSIS The distinguishing features are shown on page 282

Complications and Sequelae Pseudopolyposis, stricture and abscesses or fistulae are the most common complications of chronic ulcerative colitis Smith and Jackson[3] report that of 871 cases studied 8 4 per cent developed either an anal abscess or a fistula They have found that polyposis and stricture occur still more frequently in the order named Bargen in his series stated that pseudopolyposis was noted in 13 per cent Anal incontinence, ulcers fissures and hemorrhoids need to be treated conservatively if they complicate either the

are malaise, loss of weight and general debility

Diagnosis A history of progressive illness with frequent attacks of bloody discharges is suggestive of this disease On digital examination, as is common in many infections of the anus and rectum, irritable contraction of the sphincter muscle is observed Ordinarily, the rectal mucosa offers a sensation of coarseness or stiffness

PROCTOSIGMOIDOSCOPY This procedure is most important, since an early diagnosis may be made in approximately 95 per cent of the cases The delineation described by Buie[68 69 70] is somewhat characteristic Early in the active phase the rectal mucosa exhibits a diffuse hyperemia[18] which gradually fades into normal mucosa as the sigmoid is approached As the disease progresses, the mucous membrane becomes edematous[3 1?3 15? ?] and pits more or less, on slight pressure by the tip of the instrument Care should attend this procedure as well as the introduction of the sigmoidoscope, since the walls are very easily traumatized and bleed readily Minute yellowish abscesses may be seen beneath the mucous layer which, upon rupture through the epithelial layer form ulcers which add a moth eaten appearance to the already granular lining of the membrane[?3 5 15 153 18] Attention has been called to the rounded or ironed out appearance, in these cases, of the valves of Houston which normally are relatively sharp[4] Eventually, due to superimposed infection of a secondary nature, these denuded



A B

FIG 238 (A) Preulcerative proctosigmoiditis (B) Chronic ulcerative proctosigmoiditis *showing marked granular appearance of the mucosa and ulceration*

areas[5 1 8 ?] become confluent to form irregular or ragged ulcerations[9 16] In the process of healing or during periods of remission, areas of scar tissue may be observed as a result of the chronic productive exudate

Fever of the septic type[? 1 8 189 74 344] is of frequent occurrence, especially during the acute stage or in exacerbations of the chronic[18] The blood count shows a moderate leukocytosis and a secondary anemia[? 81 ?9 116 1 3 1?3 1 8 ?16]

EXAMINATION Material may be readily obtained through the sigmoidoscope by rotating sterile cotton swabs against the bases of two or more ulcers or by the curette, the capillary pipette heretofore mentioned may also be used At least two specimens should be taken and placed immediately in dextrose brain broth or cystine broth Rosenow's medium and technic are as follows

Distilled water	1 000 cc
Dehydrated bactonutrient broth	8 Gm
Sodium chloride	8 Gm
Andrade's indicator (0 5 Gm acid fuchsin in 100 cc distilled water) decolorized with 17 cc normal NaOH	2.5 cc
Glucose	2 Gm

tions may be found associated with chronic ulcerative colitis The incidence is shown in the preceding table

Treatment MEDICAL MANAGEMENT In ulcerative colitis more than probably any other disease close co operation between the internist, the surgeon and the laboratory is most essential in the management of its various stages and complications

Rest in bed with absolute quiet is maintained during the fulminating stage and during the acute exacerbations incident to the chronic stage until all the toxic symptoms and pyrexia have disappeared Following this a gradual return to normal physical and mental activity is permitted by prescribing a definite daily program of activities

THE DIET For the average case, the essential features of a diet are that it include an adequate caloric value, be rich in vitamins [13] of low residue, nonirritating and balanced with the proper percentages of carbohydrate, protein fats and minerals Bargen[23, 30] suggests cereal, brewer s yeast, cream butter sugar bread or toast eggs, rice potato meat, fish and custards in small portions later cooked fruits and green vegetables milk tomatoes and orange juice may be added The consumption of large quantities of fluids commensurate with the loss by rectal discharges is advocated Vitamins in concentrated form are prescribed, the daily intake being higher than for normal requirements A constant watch must be kept for early signs of deficiency disease and whenever present, it must be vigorously treated

LOCAL TREATMENT Many drugs have been recommended for topical application through the sigmoidoscope It is to be remembered that if possessing irritant characteristics they may result in more harm than good However, the use of silver nitrate 10 per cent solution gentian violet 2 per cent or parathiocresol and insufflation of thymol diiodide or calomel and bismuth powder may assist in healing the ulcerated areas of the rectum and sigmoid Instillations of ichthyol 25 per cent aqueous solution, and warm cod liver oil, especially have proved highly beneficial in relieving rectal tenesmus Silica gel and neoprontosil have been recommended also



FIG 241 R S, age 61 Chronic ulcerative proctitis showing extensive involvement of entire colon

Murray [?] in a preliminary report on the chronic type of colitis treated with cod liver oil instillations stated that in 1939 he had begun to use Newfoundland cod liver oil therapy in ulcerative processes located in the rectum and sigmoid He found that this form of therapy administered alone or in conjunction with other treatment was of apparent value in mild cases Whether this type of treatment would be beneficial to the more severe types could not be evaluated, since none of the patients treated during the three years were of the severe type In the treatment one ounce of the oil was instilled while the patient was placed in the inverted position The average number of instillations given was thirty nine

When the inflammatory process is confined to the rectum topical application and irrigations may be judiciously employed together with other forms of treatment If, however the proximal segments are involved their value is questionable It has been our custom to use a suspension of



Fig 240 W R, age 26 Roentgenographic study showing extensive ulceration

acute or chronic types of colitis It has been very definitely shown that not only do the symptoms of colonic diseases become more pronounced but the resulting wounds of anal surgery heal very slowly and very often with a soft granulation tissue rather than the hard and firm granulations ordinarily found present in healthy individuals Obviously acute conditions such as abscess formation need incision and immediate drainage and, where surgical intervention is unavoidable, only a minimal procedure should be attempted

Due to the increasing prevalence of pseudopolyposis found in this disease and because of the recent work of Soper[39] and Bargen[ ] and others[22] which has emphasized the relationship of pseudopolyposis to malignant disease, the sequence of events of the latter is very often a chronic ulcerative colitis, multiple polyposis and terminal malignancy Wherever malignant neoplastic growth is superimposed on chronic ulcerative colitis, a grave prognosis ensues It also follows that the cure of the colitis and the removal of the polyps would yield the best results In a recent series of 200 cases Bargen found 17 cases of carcinoma ? of lymphosarcoma and one of lymphatic leukemia Ricketts[290] and Brust[60] have also reported these findings and stressed their importance It can therefore be stated that, although malignancy has been thought of as a comparatively rare complication of chronic ulcerative colitis it must always be anticipated wherever pseudopolyposis has been encountered[3, 34] (See Chap 19, p 615) Sigmoidal perforation,[4, 5, 15, 184, 33] endocarditis, fatal hemorrhage,[80, 81, 1.2] clubbed fingers,[311] arterial thrombosis[ ] and hepatic abscesses[11] are all comparatively rare complications but nevertheless have been reported

Associated Conditions Various condi

TABLE 14 INCIDENCE OF ASSOCIATED CONDITIONS OF ULCERATIVE COLITIS

	No Cases Ulcerative Colitis	Per Cent of Cases with Polyposis	Per Cent of Cases with Carcinoma	Per Cent of Cases with Stricture	Per Cent with Pericolic or Perirectal Abscess	Per Cent of Cases with Arthritis
Streicher[34?]	217	9 7	1 ?	7 4	0 4	
Helmholz[add ref] et al	8 1	16 2	3 ?	11 ?	8.3	6.3
Feder[add ref]	83	12 5	0	15 9	10 ?	2 2
Jordan[192]	450	0	0	3.3	12	0
Renshaw[add ref] et al	336	10	0 6			
Bockus[add ref]	200		1 5			
Hurst[add ref]	40	12 5		12.5	12 5	2.5
Cattell[380]	450		2			
Cattell[90 391]			7			
Bacon	2 4		0 61	6	3 9	

thiazole also have been found to be effective against this syndrome.[89, 373]

In the streptococcic type (thrombo-ulcerative colitis), which affects by far the largest group of those having the so-called chronic ulcerative colitis, prontosil and neoprontosil have been used successfully. They possess the added value of wide limits of safety and relative lack of toxicity, moderately rapid excretion from the body and possession of an action apparently in addition to that of sulfanilamide. Sulfaguanidine and sulfathiazole have proved valuable in some cases.

In the regional type there is a segmental form of ulcerative colitis which resembles in many respects regional ileitis. A better term, however, and one that includes segmental inflammatory disease of any portion of the intestine would be regional enteritis. In this type sulfaguanidine is the drug of choice.

Streicher[34] is of the opinion that the main line of attack in these cases is strictly



FIG. 242. J. M. Chronic ulcerative colitis showing stricture of rectum.

SUMMARY OF REPORTS ON THE USE OF PHTHALYLSULFATHIAZOLE IN CHRONIC ULCERATIVE COLITIS (SULFATHALIDINE)

Author	Type of Case	Number of Cases	Results: Good	Fair	Poor
Streicher	Acute	22	20	1	1
	Chronic	58	54	1	3
Bargen		37	6	1	10
Poth and Ross		6	6		
U. of M.		21	12		9
(Block and Pollard: Gastroenterology 10:53.)					

DATA ON USE OF VARIOUS SULFONAMIDES IN THE TREATMENT OF ULCERATIVE COLITIS

Author	Drug	Number of Cases	Results: Good	Fair	Poor
Bannick *et al*	Neoprontosil	12	9		3
Brown *et al*	Neoprontosil	29	13	13	3
Streicher	Neoprontosil	36	6	2	28
Feder	Sulfanilamide	3			3
Dack *et al*	Sulfanilamide	10			10
Collins	Sulfanilamide	44	26		18
Streicher	Sulfanilamide	17	2	1	14
Aguilar	Sulfapyridine	200	200		
Streicher	Sulfathiazole	15	3	4	8
Mill and Mackie	Sulfathiazole	59	23	23	13
Mill and Mackie	Sulfadiazine	71	35	21	15
U. of M.	Various	15	9		6
(Block and Pollard: Gastroenterology 10:47.)					

DATA ON USE OF SUCCINYL SULFATHIAZOLE (SULFASUXIDINE) IN CHRONIC ULCERATIVE COLITIS

Author	Type of Case	Number of Cases	Results Good	Fair	Poor
Pollard		35	27		8
Streicher	Acute	39	27		12
	Chronic	68	48	14	6
Collins and Hewlett	Early	32	28		
	Chronic	23	13		
Crohn		28	16		12
U of M		5	34		18
(Block and Pollard Gastroenterology 10 52)					

sulfathalidine by rectum in dosage according to the kilogram weight of the patient One half of the amount is given orally in divided doses four times daily and the other half is administered rectally in divided doses twice daily In our experience this regimen has been beneficial In all patients instillation of cod liver oil, six ounces, are used nightly as a retention enema

CHEMOTHERAPY The present consensus favors employment of the sulfonamide compounds in the treatment of chronic ulcerative colitis The advent of the poorly absorbable types such as sulfaguanidine succinylsulfathiazole (sulfasuxidine), and phthalylsulfathiazole (sulfathalidine), has brought out a therapeutic agent with a generally low toxic factor in terms of continued use of the drug

Collins quoted by Crohn,[101] suggests their administration by rectum in the form of retention enemata in the early nontoxic cases Bargen and Necheles[94] employ a combination of the poorly and readily absorbed sulfonamides simultaneously, believing that a synergistic effect is possible and that the mucosal ulceration should be attacked through the blood stream due to the local effect of the sulfonamides being inhibited by the presence of certain amino acids, exudates and pus Succinylsulfathiazole produces a soft or semiliquid stool in most instances, while phthalylsulfathiazole tends to produce a solid type of evacuation which would suggest a definite value However, there is a tendency for the latter drug to cause more toxic reactions than the former In addition, there is the necessity for using cleansing enemata and purgatives which should always be avoided where possible

In our department, the results achieved during the past four years have been improved by employing both neoprontosil and succinylsulfathiazole One group of 71 cases was treated with sulfasuxidine administered in dosage according to the kilogram weight of the patient (0 25 Gm per kilo) The drug was given in divided amounts every four hours for two weeks followed by a rest period of ten days which constitutes one course Several courses have been employed, although in three instances the patients were unable to tolerate the drug

Chemotherapy has been a valuable adjunct to the treatment of many inflammatory diseases of the human organism[14] Sulfanilamide was primarily administered orally in doses of from 50 to 75 grains a day for three or four weeks with a resultant striking transformation in the proctoscopic appearance of the lesions Unfortunately, there was a recurrence of the infection in a few weeks time but, with the administration of sulfanilamide retention enemata healing of the proctitis was noted within several months time in some cases

In the ulcerative colitis resulting as a late phase of bacillary dysentery, sulfaguanidine has been credited with potent antibacterial properties and should be administered in one gram doses every 2 hours so that 12 grams is administered during each 24 hour period Sulfadiazine and sulfa

given an average of three grams daily, one gram by mouth and two grams intramuscularly In only one was slight improvement observed, and this was only temporary

Vaccine and Serum Therapy Bargen[18] suggested the use of vaccine and serum in order to desensitize and immunize these patients suffering from chronic ulcerative proctocolitis The former is indicated during the chronic course, whereas the latter is of especial benefit in the acute cases or in severe exacerbations of the chronic The vaccine[19] is prepared by isolating from the rectal ulcers the diplostreptococci from which a vaccine is made An initial dose of 0 1 cc is administered subcutaneously and increased every third day until one cc has been given[11] The amount of the vaccine and the number of injections depend on the severity of the disease and the tolerance of the patient Bargen as well as other investigators[43, 73, 206, 231, 258, 272, 279, 329, 331] reports favorable results with this form of treatment The serum employed in the acute fulminating types is obtained from horses previously immunized by injection of various strains of diplostreptococci in ascending dosage In order to avoid serum sickness, which occurs when the whole serum is used Fasting[79] prepared a specific antibody solution An initial dose of 0 1 cc is administered intramuscularly and increased by 0 1 cc every eight to twelve hours until 3 cc have been given [1] As with the vaccine the amount of serum is graded according to the tolerance of the patient As Bargen remarks This concentrated serum has been employed in a series of more than 700 cases and although it leaves much to be desired its results surpass any heretofore obtained by other forms of treatment'

It should be mentioned however that various workers report encouraging results with other vaccines and sera For instance Mackie s[225] and Thorlakson s[314] reports are favorable using antidysenteric sera Yeoman s cases[1 8 3 9] responded to autogenous vaccines prepared from cultures of the predominating organisms obtained from the rectal ulcers

Wilkinson and Smith[372] administered intravenous injections of typhoid vaccine to induce febrile reactions, finding that it may, in some instances, restore to active life certain patients with the nonspecific type of ulcerative colitis The criteria for selection of those deemed suitable for this therapy have been evolved by them by trial and error and are met by approximately 50 per cent of all nonsurgical patients The prerequisites are as follows (1) the patient must be afebrile (2) must be free from concomitant disease and (3) should possess adequate cardiac, renal and hepatic functions It is essential that the vaccine not be u ed during the acute phase or for the specific types of the entity Following approximately 18 months of observation in a series of 40 patients the authors report that 20 of them have been completely relieved of symptoms or greatly improved in 11 the condition was reported as moderately improved Patients were hospitalized and 10 injections were administered intravenously, one every other day The initial dose varied from three to fifteen million bacteria although smaller amounts were given to those experiencing allergic reactions from other causes The dosage was increased 50 per cent on each succeeding injection to duplicate the original temperature rise which should be to 102 or 103 degrees F to obtain the best results Following the administration of 10 injections treatments should be given every other week and then monthly with the dosage approximately one third the maximum dose Should the temperature curve exceed 105° F, treatment is to be abandoned

Sealy and Brown[316] report the usefulness of both vitamins K and C in controlling severe hemorrhage in ulcerative colitis One of the authors (Brown) called attention to the deficiency state invariably accompanying severe gastro-intestinal disorders characterized by vomiting and diarrhea He was of the opinion that a C vitamin deficiency was the causative factor due in some instances to a patient s having an intolerance to citrus fruits This in turn

DATA ON THE USE OF PENICILLIN IN ULCERATIVE COLITIS

Author	Type of Case	Number of Cases	Results Good	Results Fair	Results Poor
Keefer *et al*		1	1		
Harford *et al*		3			3
Korostoff and King		5	5		
Streicher	Acute	5	5		
	Chronic	40	40		
Palmer and Ricketts	Chronic with acute exacerbation	3	3		
Lyon		4			2
Katz	Acute	1	1		
Hamilton *et al*		2			2
Craig *et al*		1			1
U of M	Acute	6	1		5
(Block and Pollard Gastroenterology 10 54)					

supportive and that it is essential to maintain good nutrition, to bolster the blood level by transfusions and to support the defense mechanism by the administration of high caloric and vitamin diets Sulfanilamide and its derivatives he found to be hazardous in treating the entity Their specificity of action on infections due to *S haemolyticus* has been established, but, while a small percentage of patients with the chronic form do harbor this organism the predominant bacterium present in the stool and obtained on culture was the *S viridans* Therefore any beneficial results obtained must be considered incidental or secondary due to indirect action He found that azosulfamide merited a more favorable position in treatment

The *Bacterium necrophorum* has been found in the great majority of cases of typical ulcerative colitis[106] However, this organism is never present in a normal colon

Treatment by the administration of sulfanilamide did not appear to hasten healing to a marked degree, although mild or moderately severe cases showed slight temporary improvement There was a tendency to exacerbation of symptoms on withdrawal of the drug

Antibiotic Agents Penicillin has had a rather sporadic trial in streptococcal ulcerative colitis[illegible] and in some cases, results from its administration have been reported a "very striking" This has occurred largely among those patients severely ill with all the concomitants of pyrexia and other symptoms indicating a septic process Even in these, the results from its use have not been at all constant In the average case, little or no effect has been achieved by its administration

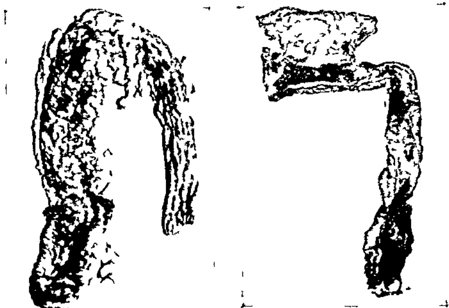
Streptomycin, both orally and parenterally, has been disappointing except in an occasional instance Eight of our patients were

EXPERIENCE IN THE USE OF STREPTOMYCIN IN THE TREATMENT OF CHRONIC ULCERATIVE COLITIS

Author	Type of Case	Number of Cases	Results Good	Results Poor
National Research Council		7		7
Zintel *et al*		4		4
DeBakey and Pulaski		16	6	10
Kirschner	Acute	1	1	
Lieberman	Acute	1	1	
Crohn		7	7	
U of M	Chronic	2		2
(Block and Pollard Gastroenterology 10 56)				

PLATE 4





(*Top*) Sigmoidoscopic view of fulminating type of chronic ulcerative proctocolitis (*Left*) Removed specimen showing extreme psuedo-polypoid degeneration (*Right*) J M age 19 Specimen showing extensive chronic ulcerative colitis Distal transverse colon descending colon sigmoid and rectum See Fig 242 and (left) Fig 246C

enhanced a tendency toward bleeding that obtains in ulcerative colitis in conjunction with a concomitant vitamin K deficiency predisposing to hemorrhage

Spiesman[37] administered colloidal kaolin and aluminum hydroxide gel (kalum) in the management of lower bowel conditions Difficulties that have been encountered heretofore in this form of treatment have been eliminated by careful selection of the kaolin used and by its use in colloidal form combined with aluminum hydroxide gel This form of therapy was previously suggested by Stein and Gelehrter[3, 1, 333]

Willard *et al*,[273] in treating a series of 100 cases of the idiopathic type of ulcerative colitis, used a bland, high caloric, high vitamin diet, given to all in the series An antispasmodic, adsorbent powder containing belladonna and varying amounts of bismuth subcarbonate or subnitrate, calcium lactate, kaolin and occasionally alkalies, was administered to 77 per cent of the series rectal instillations of acriflavine base in 74 per cent, autogenous vaccines in 73 per cent, and added vitamin concentrates in 71 per cent Seventy odd per cent of the series were hospitalized at least once In addition to the above therapy, iodine per oram, sedatives, opiates, ultraviolet irradiation, parathyroid extract, transfusions, antidysenteric sera, antiamebic therapy, Bargen's vaccine, bacteriophage, roentgen therapy, instillations of potassium permanganate, mercurochrome, oxygen, parathiocresol (sulphen), a proprietary irradiated, liquid petrolatum derivative (radolatum) and mercurochrome intravenously The authors found that of the entire series, the group showing only involvement of the rectum and sigmoid presented the best outlook and the poorest results were obtained in those with extension to the right colon The primary requisite in the study of this series of 100 cases was diffuse involvement of the rectal and sigmoid mucosa

Mackie,[37] in treating his cases of chronic ulcerative colitis, administered hydrochloric acid in amounts up to 4 cc with meals, finding it of definite value in the presence of anacidity, additionally, it tends to control distention and flatulence and to curtail the attacks of diarrhea Sedatives such as phenobarbital and at times opium derivatives are useful in the presence of colonic hypermotility These are, however, contraindicated in those cases presenting hypomotility In the latter type the number of stools and the amount of pain present are usually controlled by a properly adjusted daily dose of a saline cathartic and large fluid intake

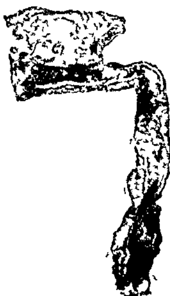
In treating the chronic ulcerative type of colitis, Drueck[123] advocated intravenous administration of 10 per cent glucose in normal saline in amounts of from 2,000 to 3,000 cc daily until the nausea and vomiting cease, the tongue becomes moist, the intense thirst relieved and a desire for food is expressed In some cases, one or more blood transfusions may be necessary The amount administered is 500 cc, whenever required Deep gluteal injections of 1 cc liver extract may be given twice weekly Anayodin was advocated by Drueck due to its poor absorptive action and definite bacteriostatic power The drug has an iodine content of 28 per cent, having a resultant action on the thyroid, which should be watched No untoward effects however, have been recorded from its use The dosage is 4 grains every 6 hours for the first day of administration 8 grains the second day and 12 grains the third day, continuing this dose for seven days This is to be followed by a rest period of one week It is to be remembered however, that while the drug combats the infective agent it does not repair the destruction to the intestinal mucosa or any other organic deformity complicating the disease

There still exists a fairly large group of patients who have ulcerative colitis of unknown origin, and the terms 'nonspecific' or "idiopathic' might well be applied to this type of syndrome, but the designation "unknown origin" may be much more suitably applied Here, too the ulcerative disease may be extensive involving long stretches of both the small and large intestine, or it

PLATE 4







(*Top*) Sigmoidoscopic view of fulminating type of chronic ulcerative proctocolitis (*Left*) Removed specimen showing extreme psuedo polypoid degeneration (*Right*) J M age 19 Specimen showing extensive chronic ulcerative colitis Distal transverse colon descending colon sigmoid and rectum See Fig 242 and (left) Fig 246C

TABLE 15 RESULTS OF MEDICAL MANAGEMENT (Monaghan)[407]

	No Cases	Mortality Per Cent	Good Results Per Cent	Poor Results Per Cent
Buzzard Richardson and Turner		28 5	76 4	
Hern	50	40 0		
Hardy and Bulmer	95	33 0	19	
Crohn and Rosenak	75	10 0	74 4	
Hopping and Bargen	329	8 0	71.0	21
Willard et al	71	29 0	42.3	18
Hurst		9 4	77 6	13
Streicher		3 0	80	17 0
Kiefer	55	18 0	55 0	27.0
		Average mortality 19 8 per cent		

may be confined exclusively to the rectum and sigmoid Whatever segment is involved the appearance of the lesion is at variance with those of the conditions described as having a specific cause, and strikingly at odds with the appearance of the bowel in the streptococcal variety Agglutination of *Shigella paradysenteriae* will be absent cultures made from the lesions and examination of the stools will not be diagnostic The lesions will be distributed irregularly and will tend to resemble those of amebiasis or tuberculosis but with all this, there will still exist a variant appearance hard to define and it has been remarked by many investigators that the ulcers are characteristic by being so uncharacteristic The same status will hold true in so far as roentgenologic examination is concerned It is a syndrome that will particularly tax the diagnostician's ingenuity and the response to one or another form of therapy will often be minimal

As shown in the above table Monaghan[407] has tabulated the results obtained by various clinicians in the medical management of chronic ulcerative colitis

SURGICAL TREATMENT The treatment of chronic ulcerative colitis is essentially a medical problem It has been estimated by those who speak with authority that 20 per cent of patients will be cured under a rigid medical regimen 60 per cent will show improvement with periods of exacerbation and remission and 20 per cent total failure In the series reported by Kiefer and Jordan, the management was approximately one half medical and one half surgical

It is conceded that for patients who do not respond to a precise medical regimen and those who develop complications surgical intervention is definitely indicated Surgery ceases to be considered the last desperate hope to prevent fatal disaster it is recognized as a means to preserve life in the presence of acute sepsis and to rehabilitate chronic invalidism Jordan[illegible] has aptly stated that the medical treatment must be regarded as a control and not a cure— Complete colectomy can be called the only actual cure of ulcerative colitis now available

The surgical procedures relevant to this disease may be classified under the following headings

A Short circuiting
  1 ileostomy
  2 appendicostomy
  3 cecostomy
  4 ileosigmoidostomy
B Vagotomy
C Resection (colectomy) — total, subtotal partial
D Management of Complications
  1 perforation
  2 massive hemorrhage
  3 obstruction or stricture
  4 pseudopolyposis and neoplasm
  5 anorectal abscesses and fistulae

The most widely used procedure is ileostomy[17, 198, 217, 41, [illegible], 288, 340] performed either as a palliative maneuver or as a preliminary step to resection Appendicostomy[407, 56] and



FIG 243A Extensive chronic ulcerative colitis in a child nine years of age Flat plate showing small bowel obstruction Ileostomy performed preliminary to resection (*Left*) Film of abdomen with child in horizontal position reveals distention of small bowel due to obstruction Miller Abbott tube coiled in fundus of stomach (*Center*) Film of abdomen with patient in upright position shows small bowel distended by gas and fluid levels indicative of obstruction Miller Abbott tube in antrum of stomach (*Right*) Further progress of tube with tip proximal to duodenal jejunal junction

cecostomy have their proponents as well, although in our experience both are inferior to ileostomy since the cecum and distal ileum are so frequently involved Transversostomy may be well chosen in those instances where the disease is confined to the left colon and rectum

The indications for ileostomy may be enumerated as follows sepsis not amenable to rigid medical regimen, remissions and exacerbations of the disease uncontrollable diarrhea, impending perforation and chronic debilitating malnutrition or anemia Jordan[197] and Bargen[22] both postulate that ileostomy should be reserved for the complications and those intractable cases where at least two or three flare ups of the disease have already been dealt with medically without appreciable benefit

Ileostomy as an emergency procedure carries with it a high mortality 53 per cent in the series reported by Cave[79, 80, 81] and 75 per cent by Cattell [380] Such can be readily understood because these patients are usually too ill to withstand any type of surgery Peritonitis should not be considered an indication Whether hemorrhage warrants ileostomy is a moot question since we have all experienced at least one instance where failure occurred In one patient of our group death ensued On the other hand ileostomy as an elective procedure offers a low mortality, from 6 5 to 9 per cent (Cattell, Cave) It is to be emphasized that the disease should never be permitted to progress beyond a point where, in the opinion of both the internist and the surgeon, the patient becomes a poor surgical risk

An ileostomy may be established as either a temporary or permanent procedure Large groups of cases are not available from which one may deduce whether subsequent closure can be satisfactorily effected According to the few reports at hand, approximately two thirds can be so treated Cattell[390] was able to close 10 per cent of his cases Crohn,[389, 393] however, never advises closure once ileostomy is made but considers it an initial step to resection

Vagotomy Based on the investigations of Dragstedt in the treatment of gastroduodenal ulcer, Dennis has employed division of the vagus nerves for chronic ulcerative colitis It is the observation of this very

TABLE 16A CLINICAL RESULTS OF VAGOTOMY IN ULCERATIVE COLITIS (Dennis)

	ASYMPT	IMPROV	NOT IMPROV	WORSE
Vagotomy alone	6	4	5	1[1]
Vagotomy with ileostomy	3	3[3]		1[4]
Vagatomy with previous ana tom is	1		1[6]	
Totals	10	7	6	2

[1] Required emergency ileostomy after barium enema 3 months later

One had both sigmoiditis and high regional enteritis the ileostomy was clo ed at the same itting One had enteritis above the ileostomy One had high enteritis and proctitis the ileostomy was closed in 4 weeks at which time the rectum had healed

[3] Two had high enteritis one proctitis

[4] Died at 3 months of multiple fistulization from high ileum to sigmoid thought at autopsy to predate surgery

Massive hemorrhage from enteritis above ileo proctostomy

[6] Previous ileoanal pull through with diseased ileum

brilliant young surgeon that this entity re sponds favorably to such division probably by reduction in colic tone Apparently the response is most marked with cases in which there is not great loss of distensibility of the bowel wall A recent report is particularly sanguine, which is shown above

Colectomy has been popularized during the past few years, and while the proce dure is a formidable one it is surprising to observe how well patients tolerate extensive resection with present day management

Indications for Colectomy Patients for whom an ileostomy has been established who present signs and symptoms of persist ent sepsis extensive scarring of the bowel fibrous stricture, pseudopolypoid degenera



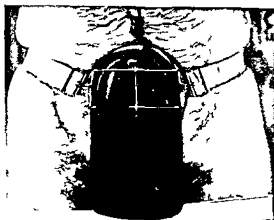




FIG 243B E M age 35, deaf mute Total colectomy including the rectum as a two stage procedure for chronic ulcerative colitis (*Upper left*) Patient following completion of colectomy (*Upper right*) Ileostomy (*Lower right*) Duval ileostomy bag Patient returned to usual work as laborer 5 weeks fol lowing resection



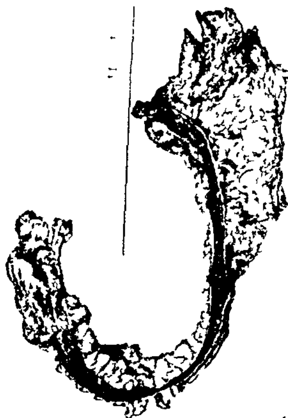


Fig 244A (*Ibo c*) Roentgenogram showing extensive involvement of distal transverse and descending colon sigmoid and rectum due to chronic ulcerative colitis Right hemicolectomy previously performed as shown on the right Specimen consisting of distal transverse and descending colon sigmoid and rectum Patient out of bed on sixth post operative day



Fig 244B L E, age 9 Extensive ulcerative colitis Ileostomy established Patient subsequently colectomized

tion [9 1 3 1,9] and arthritic changes[1,3 3 3] should be colectomized The operation may be performed in a single stage or in multiple stages Ordinarily an ileostomy is made as the initial step and following a varying period of time, the right, transverse and left colon are removed Thereafter, the rectum and lower sigmoid are excised by an abdominoperineal maneuver While complete colectomy is usually indicated, there are many instances where partial colectomy or segmental resection can be satisfactorily performed Devine[116] has devised a multiple stage method which, like others permits rest and medical management between stages in extremely ill patients

Ileosigmoidostomy and ileorectostomy are frequently recommended either as a deliberate therapeutic approach or as a preliminary to colectomy To such the author cannot subscribe, since the percentage of patients who are free and remain free of disease in the rectum and sigmoid are extremely few It is recognized that this disease begins in the rectum and sigmoid in more than 90 per cent of all cases This



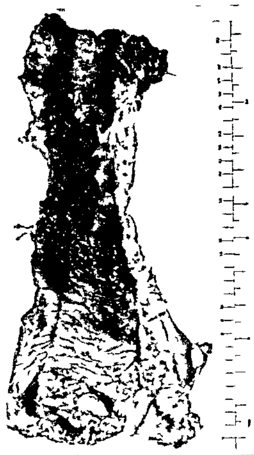


FIG 245 E M age 35 (*Left*) Opaque enema study disclosing extensive chronic ulcerative colitis Ileostomy followed by segmental hemicolectomy (*Right*) Specimen removed at time of right hemicolectomy Note distal ileum cecum ascending and proximal transverse colon Cecum is relatively free of ulceration serpiginous appearance of mucosa is observed Distal bowel including rectum subsequently removed (See Figs 243 A and 244 B)

is confirmed by Bargen[1] and others[-49] In Jordan s series of 430 patients with chronic ulcerative colitis, the rectum was involved in 407 or 94 per cent It is therefore, our frank opinion that the rectum should be extirpated except in the very occasional case

Some mention should be made pertinent to transplantation of an ileostomy to the anus with sphincter preservation following colectomy Rudolph Nissen[38 386] now of New York and formerly of Istanbul reported such a procedure in 1933 for multiple polyposis Ravitch of Baltimore recorded his experiments on dogs in 1947,[38] and this year cited his experience with ingenious modifications in five patients with chronic ulcerative colitis[383] Ravitch states that neither incontinence nor excoriation of the anal skin has been a problem and that complete sphincter continence and good sphincter tone are gradually regained after operation Although we have transplanted the transverse colon to the anus and preserved the sphincters as an integral part of hemicolectomy and proctosigmoidectomy[389 390] the author has had no experience with transplantation of the ileum to the anus Wangensteen[391 9?] did employ this method in two instances but because of skin excoriation was compelled to replace the ileum to the abdomen Babcock similarly performed this procedure in three instances of ulcerative colitis and for the same reason returned the ileal stoma to the abdomen in two The third patient expired Payne and Hay both of Minnesota, each had one case in which replacement to the abdomen was necessitated by the marked degree of anal excoriation

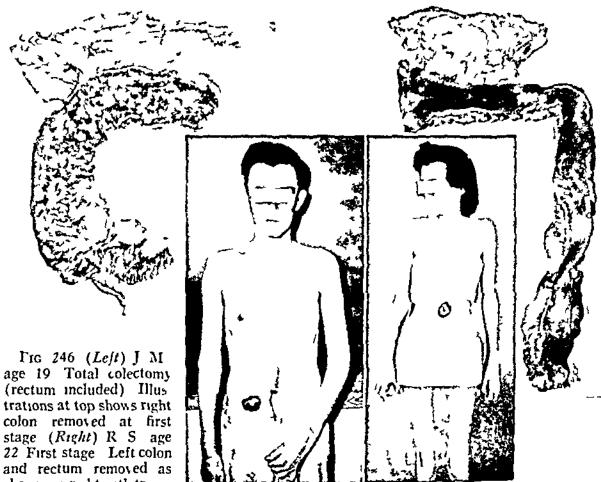


FIG 246 (*Left*) J M age 19 Total colectomy (rectum included) Illustrations at top shows right colon removed at first stage (*Right*) R S age 22 First stage Left colon and rectum removed as shown on right with transversotomy Right colectomy was performed as second stage with permanent ileostomy Patient gained 30 pounds

Management of Complications In the presence of impending perforation, ileostomy may be well chosen In peritonitis, on the other hand it is probably better to employ watchful waiting" with antibiotic and chemotherapeutic measures Hemorrhage has been referred to previously Obstruction calls for surgical decompression, while stricture and pseudopolyposis demand colectomy

TABLE 16B COMPARATIVE SURGERY IN CHRONIC ULCERATIVE COLITIS

AUTHOR	ILEOSTOMY	PER CENT MORTALITY	ILEOSIGMOIDOSTOMY	COLECTOMY	PER CENT MORTALITY	PER CENT OVERALL MORTALITY
Cave[79 80 81]	65	18	11	55	10 9	19 5
Cattell[380 382]	145	18		121	20 8	
Garlock[153]	15	13.3	6	16	18 7	20
Idem[15]	38	15 7	21	46	10 8	
Bargen and Pemberton[?]	130	26 9	20	30	36 3	
McKittrick [?3]	54	27 7		10	10	
Rankin [88]	26	31 7				
Lemmer [17]	17	23 5	4	11	18	37
Ferguson[381]	14	?		9	?	14 ?
Best[383]	8	12 5				
Ault[404]	6	16 6		13	15.3	
Wangensteen[3?]				13	None	
Bacon[384]	21	19		14	None	

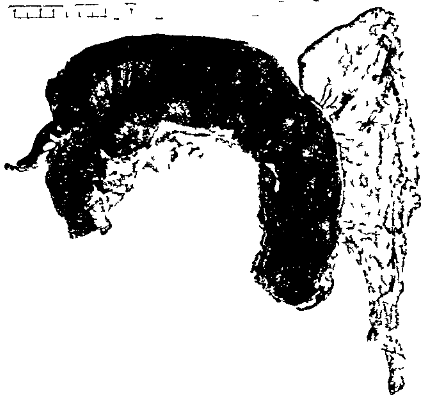


FIG 246 (C, *Top*) J M age 19 same as shown in roentgenogram Figure 246A Right colon removed following ileostomy Left colon and rectum shown in Plate 2 right lower (D *Bottom*) W N male age 34 Chronic ulcerative colitis Removed specimen shows distal ileum and entire colon

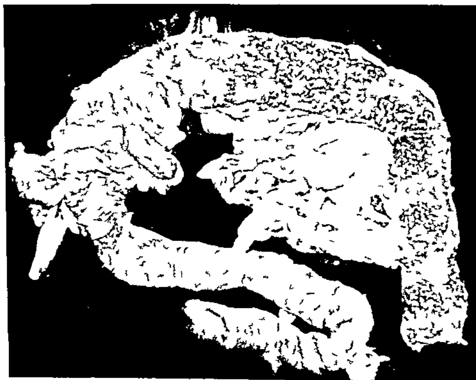
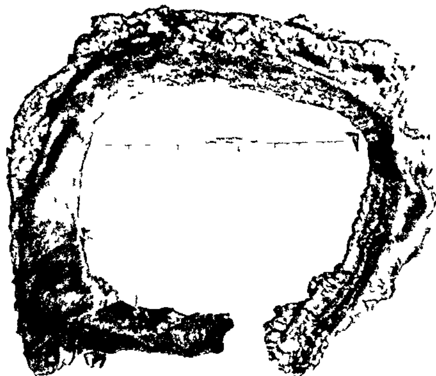




FIG 246 (*E, Top*) L F female, age 9 Chronic ulcerative colitis See Figures 244B and 245 Ileostomy initially performed Right colectomy (specimen not shown) left colectomy above showing extensive scarring narrowing and loss of *mucosa Child living and well after stormy course following each stage* (*F, Bottom*) J DeR, female, age 38 Chronic ulcerative colitis Specimen shows distal ileum and entire colon



Management of Anorectal Pathology It is quite true that infections in this site are of common occurrence Many require surgical intervention particularly abscess, fistula and fissure, but the presence of residual hemorrhoidal tissue, hypertrophied papillae and incontinence are certainly elective procedures and may be postponed until amelioration of symptoms are observed and improvement of the mucosa is evident A distressing hemorrhoidal prolapse may necessitate surgical removal yet the surgeon can design the operation conservatively under sacrocaudal analgesia using the clamp and cautery technic and thereby avoiding the introduction of suture material As a precautionary measure it is well to bear in mind the words of Pope, 'For fools rush in where angels fear to tread '

The results achieved by surgery are appended in Table 16B

Comparative Results of Medical and Surgical Treatment

Many investigators have been prone to discredit surgery in the treatment of chronic ulcerative colitis except in the presence of superimposed malignant degeneration, abscess formation perforation and obstruction As a matter of fact, the high mortality usually cited attends performance of emergency ileostomy, which in the majority of instances results from tardy consultation with the colonic surgeon and not from the institution of either elective ileostomy or colectomy Attention is called to the results achieved from medical management and from surgical treatment For comparison Table 15 and Table 16A may be summarized as follows

	Table	Total Number Cases	Average Mortality Rate
Medical Treatment	15	675	19 8 per cent
Surgical Treatment			
(a) ileostomy	16	442	22.3 per cent
(b) colectomy	16	266	14 0 per cent

It will be noted that the mortality rate is less from colectomy than from medical treatment further that the rate from ileostomy, both emergency and elective, is only slightly higher than from a medical regimen

Summary and Comment Patients suffering from this devastating malady must in every instance be carefully and thoroughly evaluated Besides the customary laboratory studies previously outlined, including repeated mucosal scrapings of the rectum, stool examinations, agglutination test, blood count, serum protein and sedimentation rate, the presence of remote pathology of teeth, tonsils, gallbladder, genito urinary organs and even the anal canal should be sought Allergic and psychiatric interpretation may be informative

In our department all patients are placed on a rigid medical regimen Briefly, this includes individualized diet with supplementary feedings, bed and graded rest, repeated transfusions of whole blood in small amounts (250 cc) plasma as indicated, parenteral administration of protein derivatives, sulfathalidine (0 1 Gm) per kilogram of body weight orally divided into four doses daily) alternating with neoprontosil (from 5 to 10 grams every 4 hours orally) parenteral administration of adequate vitamins crude liver extract (1 cc intramuscularly) every second day as necessary dilute hydrochloric acid when evidence of achlorhydria is manifest and retention installation of warm cod liver oil (6 to 8 ounces) each night

At no time do we hesitate to employ antiamebicides, such as emetine, diodoquin and chiniofon alternately, even though repeated stool examinations and particularly mucosal scrapings are negative for the parasite

When severe exacerbations and remissions of the disease have occurred on two or three occasions surgical intervention is indicated Ordinarily a preliminary ileostomy is established followed later by colectomy Removal of the rectum is required as the final step (total colectomy)

Our experience has been particularly limited and in no way compares with the large series of others Of the ileostomies performed either as an emergency or elec

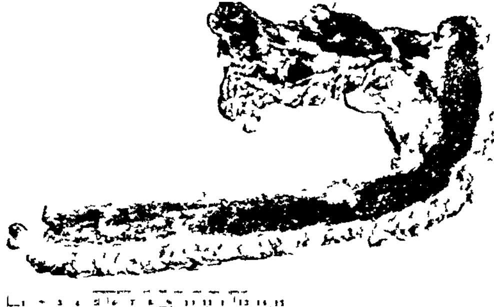
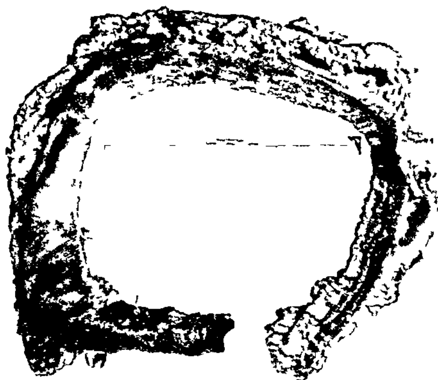


Fig 246 (E *Top*) L E, female age 9 Chronic ulcerative colitis See Figures 244B and 245 Ileostomy initially performed Right colectomy (specimen not shown) left colectomy above showing extensive scarring narrowing and loss of mucosa Child living and well after stormy course following each stage (F, *Bottom*) J DeR, female age 38 Chronic ulcerative colitis Specimen shows distal ileum and entire colon



Visceral reflexes, as in renal or gall bladder colic,[200] are contributing factors, as is lymphogranuloma venereum[27, 76, 200, 311, 3] The condition has been found present in subtertian malaria and advanced lues[200] Spinal cord tumor formed as a result of trauma has been mentioned[201] Tuberculosis, septicemia, leukemia and thyroid disease are listed as etiologic causes[200]

Pathology It is extremely difficult to follow these cases to necropsy mainly due to the fact that these patients do not die of the entity but rather of some other morbid condition Although the walls of the intestine are thinner than normal, very little change is noted Signs of congestion and ulceration are uncommon unless secondary infection is superimposed[1] Usually the follicles are distended with mucus which imparts a shiny appearance to the mucosal surfaces The mucus is glairy tenacious and occurs in ribbonlike shreds, sheets or clumps On examination it shows no elements of inflammation or epithelial debris Thus far no definite organic pathology has been observed in this condition

Symptoms The most characteristic symptom is the discharge of mucus from the bowel[34, 37] The quantity may be variable At times the stools are merely spotted with jellylike masses of mucus while at others the mucus is very abundant Although usually gray in color it may appear brown if admixed with feces Bleeding of any degree is uncommon Other writers also declare the presence of blood in the stools to be symptomatic[2, 173, 1, 163, 1, 8, 184, 189, 315] The mucus may appear in long shreds or may conform to the shape or part of the intestinal wall and may be discharged alone or mixed with fecal matter Not infrequently the passage of mucus is preceded by some abdominal pain[81, 116, 1, 1, 8, 31] which is more or less colicky in type It is interesting to note that when these patients are questioned closely it is elicited that the attacks which are intermittent in character, are precipitated by some emotional strain or physical illness Constipation,[315] which is usually the spastic type is frequently related in the course of obtaining a history, for, although an occasional diarrhea is mentioned[1, 1, 8, 1, 31] which is largely mucus, the stools often remain hard and of firm consistency In some cases however, constipation may alternate with diarrhea Various associated symptoms may be complained of, such as flatulence, anorexia,[1, 1, 1, 163, 274, 3, 3] headache, myalgia, arthritis[1, 3, 373] and general malaise Depression and introspection are common manifestations Asthenia[63] avitaminosis,[163, 18] anemia[76, 81, 79, 116, 173, 1, 1, 1, 8, 46] anacidity,[81, 237] epigastric tenderness[1, 9] dehydration,[87, 190, 260, 317, 3] erythema,[34] hypo acidity,[237] hemorrhage (in the severe types)[80, 81, 163] jaundice[34] local ischemia,[25] loss of weight,[2, 123, 1, 163, 158, 224, 274] nausea and vomiting[123, 1, 163, 158, 189, 224, 34] pyrexia,[158, 189, 274] subpyrexia[6] stomatitis[316] tachycardia,[274] tenesmus[3, 74, 31, 37] tarry stools,[22] intestinal toxemia,[123, 1, 163] uvulitis[1, 8] and occult blood in stools are among those mentioned[72] Among the incidental findings in connection with this syndrome may be mentioned hyperperistalsis and hypermotility[237] decreased plasma proteins[23] nyctalopia[218] xerophthalmia and hemeralopia[218] polynuclear infiltration[237] sinus formation[66] and inversion of the albumin globulin ratio[74] Allergy and allergic phenomena are also incidental findings[23, 373]

Diagnosis A history of the periodic passage of large quantities of mucus and some abdominal discomfort is highly suggestive of the presence of this syndrome On sigmoidoscopy our findings in these cases are similar to those noted by Bockus[24] The mucosa appears shiny and lustrous engorgement of the larger venules is present together with injection of the capillary network Scattered areas of pallor may be seen but we feel that this represents a somewhat later phase Frequently plaques of thick, glairy mucus varying in size and shape may be observed Differing degrees of spasmodic contracture may be noted in the sigmoid and may be some index as to the type of patient Usually this is verified by testing the reflexes Since at the time of traumatism

tive procedure, the mortality rate has been 19 per cent (See Table 16B) There were, however, fourteen colectomies, either total or partial, without a death In twelve the rectum was removed the remaining two are in the interval stage awaiting removal

Gonococcic and syphilitic proctitis may be found under Venereal Diseases, Chapter 13 and under Tuberculosis, Chapter 14

NONINFLAMMATORY CONDITIONS

MYXORRHEA PROCTOCOLI

Definition This disturbance, which is designated usually as "mucous colitis," may be defined as a syndrome characterized by the excessive production of mucus and its passage from the bowel, by abdominal pain and by various nervous phenomena As stated,[3, 6] the term colitis signifies an inflammation of the colon and should be avoided in describing disturbances of a functional nature Inasmuch as this condition involves the lower colon and upper rectum, we may justly consider and include it under the heading myxorrhea proctocoli

Synonyms Mucous colitis membranous enterocolitis enteropathy,[33] spastic colitis unstable colon irritable colon mucous colic

Incidence Usually those affected are between the ages of thirty and forty five years As to sex, females are more prone to be troubled in the ratio of 4 to 1 Those having sedentary habits apparently have a greater disposition to the affection

Etiology The cause of this peculiar syndrome is a moot question It is, quite obviously a difficult topic to discuss because the factor of opinion enters so largely into the interpretation of the clinical phenomena It is not always easy to adduce evidence which is clear cut or beyond criticism Some[1, 60, 108, 149, 23, 340, 347] believe that it is a secretory neurosis brought about by some disturbance relevant to the central nervous system[77, 9, 1, 00, 237, 274, 31, 33] while others[170, 316, 34, 304, 7] are of the opinion that it is essentially a catarrhal inflammation Still others contend it is a combination of the two Bassler[8] however is firm in his assertion that mucous colitis is secondary to an existing intestinal toxemia and remarks, "The instability in the vegetative nervous system is induced from the bowel state" Drueck,[123] Garlock[1] and the same author,[1, 3] speaking from a surgical standpoint, postulate toxemia as an etiologic factor It has been shown[170] that some individuals possess a hypersensitivity to the organisms normally found in the intestinal tract, so that this condition may be induced thereby In like manner, some patients may be especially sensitive to certain foods[29, 12, 200, 237, 274] which may bear influence in the intestinal mucosa Too various disorders of the endocrine system may play an important role Mention has been made[312] that the exaggerated production of volatile, fatty or organic acids may disturb the acid balance, and by acting on the sympathetic nervous system, induce this syndrome Mechanical causes, constipation,[31] intestinal stasis,[40, 41] enterogenic anomalies and irritants—such as the long continued use of drastic catharsis—are to be considered mineral oil and mineral oil preparations[200] have also been mentioned as causative factors No doubt the frequency of visceroptosis as has been mentioned,[131, 1, 7, 220] is a contributing cause Although transient[194, 218] overstimulation of the parasympathetic[62] or inhibition of the sympathetic system may produce a hypersecretion of mucus and colonic spasm According to Bockus[4] there is a preponderance of parasympathetic impulses to which the term "generalized vegetative upset" may be applied The recent interest in the psychogenic background of this disorder is definitely to be observed and may often lead to a solution of the problem Murray,[3] Weston[371] and others who have interested themselves in this phase are of the opinion that in nearly every case psychogenic causes are evident Sexual maladjustment and marital incompatibility appear to be the more frequent factors In many cases the attending physician may be assisted in instituting psychosomatic treatment, but in the more advanced cases a psychiatrist would probably obtain better results[313]

Phenobarbital may or may not be added as additional sedation Weston[371] reported a series of 25 cases treated with syntropan

Diet The diet is of importance In the presence of an existing inflammatory process, the dietary should be bland and non irritating, composed of those foods that will, in part, diminish peristalsis and lessen the secretion of mucus [118] Therefore, cereals such at oatmeal, cream of wheat and farina milk, eggs, stewed fruits and small amounts of fish chicken, lamb beef, liver, sweet breads potatoes spinach, asparagus and purees of pea and bean may be prescribed By many [1 141 31] this is considered the proper dietary treatment Where constipation must be corrected, a coarse menu consisting of bran butter fruits such as grapes and currants green vegetables such as spinach lettuce and celery, and other roughage is advocated [345] For constipation, mineral oil and agar agar may be employed Instillations of warm olive oil, from six to eight ounces are helpful Attacks of abdominal pain may be relieved by heat externally applied and by turpentine stupes Belladonna may be used advantageously to diminish the spasm In tincture form 10 minims may be given every three or four hours until the acute symptoms are allayed Calcium lactate by mouth in one drachm doses thrice daily and calcium gluconate 5 cc of a 10 per cent solution intravenously, may be administered Parathormone given intramuscularly every second day in 12 minim doses (0 75 cc) and combined with the above appears to exert a relaxant effect on the musculature and to reduce the secretion of mucus

Enemas and irrigations containing irritating chemicals are to be avoided although cod liver oil by rectum may be used to advantage

Melanosis Proctocoli

Melanosis proctocoli may be defined as a morbid condition of the large bowel characterized by the deposition of black or brown pigment in the mucous membrane usually without any inflammatory process

First referred to by Cruveilhier in 1928,[103] this disturbance of the bowel is worthy of consideration, for it is encountered occasionally during routine sigmoidoscopic examination, at operation and at necropsy Virchow offered a brief description in 1847[363] and called it "melanosis coli," while Solger[3 8] applied the term "colitis pigmentose" By means of the sigmoidoscope, Pick in 1911[77] recognized this medical curiosity as a distinct entity and in his writings referred to it as the brown bowel"

Incidence Melanosis proctocoli occurs in approximately 0 25 per cent of patients examined sigmoidoscopically [3 9] It is more common in the male sex[33] and between the ages of 30 and 50

Hypotheses as to Etiology Various divergent and confusing theories have been promulgated as far as the cause of colonic melanosis is concerned and because the evidence is not conclusive it seems expedient to mention briefly some of the more important ones The most significant and influential factors in the etiology are chronic intestinal stasis and the use of anthracene cathartics over a long period of time That the latter plays an important role was first mentioned by Bartle [36] It is now generally conceded that chronic constipation is a contributing but not an initial etiologic factor and that the pigmentation accompanies but does not cause the intestinal stasis Bockus contends that the deposition of pigment probably results from the phagocytosis of the pigment of the anthracene group Chief among this group of cathartics is cascara although senna aloes rhubarb and frangula have been mentioned as offenders Virchow[363] described the pigmentation as a hemochromatosis Pick[77] was of the opinion that it was due to the products of protein disintegration which were acted on by tyrosinase and converted into melanin Hueck[1] brought forth the theory that the pigment does not belong to the melanin group but is a lipofuscin further, that the splitting of certain products of digestion gives rise to a "propigment of a lipoid nature and this is affected by ferments giv



FIG 247 Unusual roentgenogram of string sign, involving the transverse, descending and sigmoid colon

by the tip of the sigmoidoscope the result may simulate mucosal erosion the instrument should be inserted carefully and advanced under direct vision Friedenwald describes three stages in the course of the disease[118] At first the vessels of the bowel are engorged and the capillary injection is especially *prominent the mucous membrane* being covered with a glairy mucus In the second stage this engorgement is less marked and the shiny appearance absent but in its stead distinct areas are noted in which the mucosa is covered with a thick, tenacious mucus which adheres closely and can be swabbed away only with *difficulty In the third stage, the mucous* membrane appears thinned out is quite pale and covered with mucus On removal, there remain minute denudations of the superficial epithelium[89, 139, 300] Palpation of the abdomen usually elicits tenderness over the sigmoid and descending colon Some evidence of a muscle defense reaction is not *infrequent*[illegible] Differentiation between visceral and parietal tenderness may be of service in distinguishing this from conditions of more serious pathologic significance that may necessitate the employment of surgical intervention for cure

X RAY EXAMINATION Roentgenographic study after the administration of a bariumized *enema gives more accurate and reliable* findings, as the colon is not always filled when the barium is taken by mouth Alterations in the contour of the bowel, such as areas of stasis spasticity absence of haustra and narrowing[illegible, 110, 189, 310, 319] are of diagnostic value The "string" sign[100] (Fig 247), which is brought about by spasm of the bowel and peristaltic movements may be best visualized from twelve to twenty four hours after ingestion of the barium Some observers however, report this finding as inconstant[111]

Treatment Effort should be made in each case to ascertain the underlying causes Since these patients usually have an unstable nervous system, the attention of the physician should be directed to this phase *of the condition Should such be the case* fresh air and sunshine,[illegible] change of habits and environment, exercise, cold baths and diathermy[illegible] are advised Ionization of salts injected into the bowel,[318] galvanism sinusoidal baths light and heat therapy roentgen therapy[illegible] and ultraviolet rays[illegible] have been advocated Tonics of nux vomica *iron, arsenic, phosphorus and vitamins*, or sedatives such as bromides and phenobarbital may be prescribed as indicated

Recently, many new drugs have been used to produce antispasmodic action for the relief of symptoms All of them are inhibitory in action, as they are parasympathetic sedatives In view of the disadvantages *of atropine dosage, these* "atropine like" drugs serve to produce a similar inhibiting effect without undesirable side *effects that are associated with atropine* administration Among them may be mentioned syntropan, bellergal pavatrine alkaloid and others

In connection with pavatrine Lehman and Knoefel[10] in their studies on the spasmolytic action of certain substances on gastric function found that acetylcholine *was liberated as the result of stimulation of* the parasympathetic system Their use of pavatrine alkaloid inhibited this spasm

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Diet The diet is of importance In the presence of an existing inflammatory process, the dietary should be bland and non irritating, composed of those foods that will, in part diminish peristalsis and lessen the secretion of mucus[118] Therefore, cereals such at oatmeal, cream of wheat and farina milk, eggs, stewed fruits and small amounts of fish chicken, lamb, beef, liver, sweet breads potatoes spinach, asparagus and purees of pea and bean may be prescribed By many[1 141 31] this is considered the proper dietary treatment Where constipation must be corrected, a coarse menu consisting of bran butter fruits such as grapes and currants green vegetables such as spinach lettuce and celery, and other roughage is advocated[365] For constipation, mineral oil and agar agar may be employed Instillations of warm olive oil, from six to eight ounces are helpful Attacks of abdominal pain may be relieved by heat externally applied and by turpentine stupes Belladonna may be used advantageously to diminish the spasm In tincture form, 10 minims may be given every three or four hours until the acute symptoms are allayed Calcium lactate by mouth in one drachm doses thrice daily and calcium gluconate 5 cc of a 10 per cent solution intravenously, may be administered Parathormone given intramuscularly every second day in 12 minim doses (0 75 cc) and combined with the above appears to exert a relaxant effect on the musculature and to reduce the secretion of mucus

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ing rise to the pigment Synnott[381] attributed the condition to the metabolic pigment melanin which is an autochthonous substance originating in situ by transformation of pre existing material Obendorfer[771] explains the pigmentation on the basis that disturbances in protein metabolism may result in excess production of waste products At an early date the ingestion of heavy metals, especially mercury and lead, was thought to be the cause[778 301] Lignac[281] believed *the condition to be due to hemorrhage with subsequent bacterial activity*, while McFarland[7] *adhered to the theory* that the pigment was formed by an *enzyme which acts on the intracellular substance of the stroma of the intestinal mucosa* Lynch[79] considers it to be due to a disturbance in the *chromogenic function of the liver*

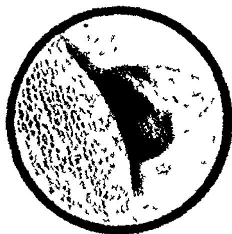


Fig 248 Melanosis proctocoli showing crocodile appearance of mucosa Drawing from a patient addicted to cascara and aloes for over two years

Pharmocognosy Many of the vegetable laxatives contain principles closely allied to *methyl anthraquinone or glucosides* which yield such substances on hydrolysis Cascara belongs to this group whose activity depends upon the presence of one or more oxides of methylanthraquinone The active principle of cascara, as well as aloes and frangula, appears to be the emodin, $C_{15}H_{10}O_5$ or trioxymethylanthraquinone

Pathology *Any portion of the colon from the ileocecal* valve to the anorectal line may be the seat of the pigmentation As would be expected, the greater number of cases is observed in the rectum and sigmoid by gastro enterologists and proctologists Bockus[25] found the pigmentation *most intense in the rectum*, diminishing from below upward The color of the *mucous membrane is somewhat variable* not only in different patients but in the same patient *It may be evenly distributed* over a large area of the rectum or arranged in a patchy manner throughout A deep reddish brown or mahogany color is usual, although an inkish black is not altogether uncommon These pigmented areas are broken up into minute islands, polyhedral *in shape*, by fine yellow or light brown striae extending in an irregular fashion The appearance is often likened to a toad's back [1] crocodile or snake skin,[8 10 303] *or a chow dog's tongue* [6] *(Fig 248)* It is quite apparent that the existence of inflammatory changes is entirely independent of the melanosis[67] Pick, in his report,[779] is quite emphatic on this point and remarks, "In the cases studied there were no secondary inflammatory changes, no ulcerations scars or catarrhal states of proliferation" It has been mentioned that melanosis is much *higher in carcinoma of the colon*,[59] *although* the writer has found but one such case in *the literature* that of Bland Sutton[49 50]

Histology The granules of pigment which vary from 7 to 20 microns are found within large mononuclear cells in the tunica propria According to Zobel and Susnow, the pigment is in the mucosal villi in mild cases, and in the advanced cases, in the *region of the muscularis or scattered through it* Infrequently, they may be seen *in the submucosa*[381] and in the mesocolic *lymph nodes*[107] *As has been shown*, the pigment contains no iron shows no bile pigment, is *never crystalline* and is insoluble in acid and alkalis[109] In a splendid scientific *dissertation on the dopa reaction* Laidlow[99] mentions that the test is specific for two kinds of cells, the melanoblast—a *term including all melanin producing cells* as distinguished from mere phagocytes—

and a myelogenic leukocyte which has no connection with melanin production Both have an enzyme, an oxidase, which converts dopa to melanin Blackening of the cell is called the dopa reaction Study of a rectum and colon with diffuse melanosis which was removed surgically showed the pigment cells were dopa negative, therefore, he concluded that there were no melanoblasts and no melanin in the colon or in the rectum above the anorectal line Boyd[30] reasons as follows 'The pigmented cells are dopa negative and are, therefore melanophores that have taken up the pigment which has either been ingested in the food or synthesized in the bowel

Symptoms So far as the pigmentation of the mucosa is concerned no symptoms are cited Invariably the patient will mention a habitual constipation and the use of various laxatives, but upon questioning after visualization of the melanosis through the proctoscope, he will usually admit the prolonged use of cascara or one of the other cathartics

Diagnosis Proctosigmoidoscopy shows the presence of mottled areas in the mucosa of the rectum and sigmoid Usually they are patchily distributed Ordinarily no evidence of an inflammatory reaction is present

Treatment There is little to be said as far as the treatment is concerned, except that withdrawal of anthracene cathartics and correction of an existing constipation usually will be rewarded by disappearance of the pigmentation It has been estimated that a period of from three to six months is required

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CHAPTER 10

Diverticulosis and Diverticulitis of the Sigmoid

DEFINITION
HISTORICAL
TERMINOLOGY
INCIDENCE
ETIOLOGY
PATHOLOGY
SYMPTOMS
DIAGNOSIS
DIFFERENTIAL DIAGNOSIS
PROGNOSIS
TREATMENT
NONSURGICAL
SURGICAL

DEFINITION

Diverticulosis is the term employed to denote the presence of sacculations along the extraluminal wall of the gastro intestinal canal diverticulitis, however is a morbid condition used to connote the presence of these sacculations in which an inflammatory change has occurred These blind pouches may occur in any site but their greatest incidence is in the large bowel According to Abel[2] in eighty five per cent of the cases the site of election is the flexure of the sigmoid colon Unless otherwise anatomically qualified herewith diverticulitis is accepted to mean sigmoidal diverticulitis

HISTORICAL

Many references on this subject are to be found in the literature especially during the last quarter century As early as 1700 Littre[4] mentioned diverticular hernia while Riolan, Gunz, Schroch and Sommering reported cases at a later date The first notable description was that by Cruveilhier[18] in 1849 shortly thereafter, published works by Virchow[68] and others appeared[9 40] Graser[9] in 1889 emphasized the importance of the disease while Beer[11] in 1904, gave consideration to the etiology and classification In 1907, Moynihan[49 50] presented a scholarly paper on its mimicry of cancer of the colon The same year Mayo Wilson and Griffin[48] reported five cases in which a portion of the sigmoid was excised Description of peridiverticulitis[8] its pathology, pathogenesis and complications followed[7 3] shortly thereafter LeWall is accredited with the first roentgenologic demonstration of diverticulitis, which was subsequently operated upon and reported by Abbe[1]

TERMINOLOGY

The term diverticulum is derived from the Latin *diverto*—"I turn aside" The suffix *culum* when appended to the verb, indicates the diminutive and may be freely translated as 'a small turning aside" This description is apt despite its brevity The lesions do not assume the characteristics of an independent entity but appear rather as projections which have 'turned aside' for a variable distance from the parent bowel (Fig 249)

INCIDENCE

The incidence of diverticulosis will probably never be accurately determined because many individuals in whom the lesions exist remain in perfect health and are not examined Consequently some observers have declared that the presence of diverticula in the intestine is only of academic interest[13] and merits no greater attention than that accorded the uncomp ap

pendix or gall bladder However while it must be admitted that diverticulosis is essentially innocuous recent statistics indicate clearly that it is a potential site of inflammation that should not be disregarded

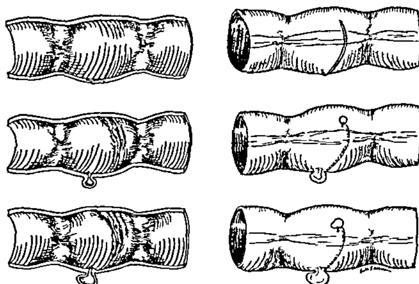


FIG 249 Schematic drawings to show the various stages in the development of diverticula The point of vascular entrance and the subsequent herniation is depicted Note that the pouch seems to turn aside from the parent bowel

Diverticula of the intestine were observed in 6 9 per cent of a series of 447 cases which came to necropsy Roentgenologically, a study of 2 747 cases also revealed the presence of diverticula in the proportion of seven per cent [1] The similarity of the statistical results in both of these instances appears to be more than coincidental and may well afford the true incidence

The transition from diverticulosis to diverticulitis has been variously reported by different authors in percentages from eleven to thirty five [4, 57, 64] In the light of these statistics it is reasonable to assume that the transition from diverticulosis to diverticulitis occurs in from approximately twenty to twenty five per cent of all cases

Sex The sex of the individual does not play as important a role in diverticulosis as was previously believed Earlier ratings gave a higher incidence in males but subsequent investigations reduced the ratio to approximate equality [3, 23] Diverticulitis according to Ochsner, attacks the male more frequently in a ratio of 2 75 to 1 Similarly, in a series of cases, now asymptomatic which gave a history of previous diverticulitis males again exceeded females, but in a lowered ratio—1 25 to 1 It is reasonable therefore, to adopt the working premise that diverticulosis attacks both sexes equally and that only in the presence of diverticulitis and its complications does that balance change to a preponderance of males

Age Diverticulitis is generally considered a disease of the latter decades of life although it has been known to occur earlier

AGE DISTRIBUTION OF SIGMOIDAL DIVERTICULITIS
(Author's Series)

AGE	NUMBER OF CASES
21 30	3
31 40	9
41 50	16
51 60	38
61 70	26
71 80	9
81 90	3
TOTAL	104

CHAPTER 10

Diverticulosis and Diverticulitis of the Sigmoid

DEFINITION	DIAGNOSIS
HISTORICAL	DIFFERENTIAL DIAGNOSIS
TERMINOLOGY	PROGNOSIS
INCIDENCE	TREATMENT
ETIOLOGY	NONSURGICAL
PATHOLOGY	SURGICAL
SYMPTOMS	

DEFINITION

Diverticulosis is the term employed to denote the presence of sacculations along the extraluminal wall of the gastro intestinal canal diverticulitis, however, is a morbid condition used to connote the presence of these sacculations in which an inflammatory change has occurred These blind pouches may occur in any site but their greatest incidence is in the large bowel According to Abel[2] in eighty five per cent of the cases the site of election is the flexure of the sigmoid colon Unless otherwise anatomically qualified, herewith diverticulitis is accepted to mean sigmoidal diverticulitis

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INCIDENCE

The incidence of diverticulosis will probably never be accurately determined, because many individuals in whom the lesions exist remain in perfect health and are not examined Consequently, some observers have declared that the presence of diverticula in the intestine is only of academic interest[13] and merits no greater attention than that accorded the uncomplicated ap

consistent with stasis the arrangement of longitudinal bands and lack of complete encirclement the presence of sacculations due to the shortness of the taenia as compared with the bowel a defect in the circular muscle coat created by the entrance and exit of blood vessels the presence of appendices epiploicae along the anterior longitudinal band and distention of the veins by passive congestion

Physiologic Physiologic characteristics include sensitivity of the sigmoid peristalsis and spasm of circular muscle

Pathologic Pathologic symptoms are adhesions causing traction diverticula muscle deficiency as the result of degeneration atrophic changes and avitaminosis

Physical Pulsion — increased pressure from within—and traction—pulling from without—are factors

At this time when much is being said and written on psychosomatic medicine it seems expedient to mention that Willey some two decades ago stated that he had no doubt but that there was a close relationship between depressing emotions and pathologic changes of the large bowel and that in the creation of the diverticulitis a sensitive and impassioned temperament was a powerful predisposing factor Synnott[illegible] however observed diverticulitis to occur rarely among the insane Willard and Bockus[9] do not believe that diverticula are prone to develop in colons which are the seat of neuromuscular irritability It is true that for the most part we are dealing with theories yet there does seem to be sufficient data to state that the cause is probably a combination of factors due principally to an increased intraluminal pressure—pulsion—and a decreased resistance to the pressure created

DIFFERENTIAL FEATURES

	CONGENITAL DIVERTICULA	ACQUIRED DIVERTICULA
Number	Usually single	Usually multiple
Size	Larger	Smaller
Onset	Occurs at birth	Acquired later
Anatomy	Composed of all coats of the bowel	No muscle coats

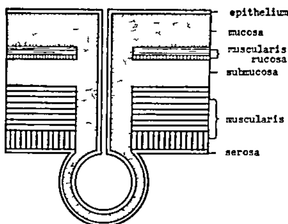


FIG 250 Schematic representation to indicate the coats of the bowel Note that only the mucosa, submucosa and peritoneum appear in the structure of the developed diverticulum

Diverticula are defects whether they are congenital—developing in utero[12]—or acquired—developing after birth Ordinarily diverticula are classified as true (congenital) and false (acquired) the former being composed of all the bowel coats namely mucosa submucosa muscularis and serosa and the latter being devoid of some of these coats usually the muscularis (Fig 250) This division is almost universal today and represents the accepted classification

Congenital Type Diverticula which fall into this category are usually single occur at birth and possess all the coats inherent in the parent bowel An excellent example of this type is the Meckel s diverticulum attached to the ileum about three to four feet above the ileocolic junction[30]

Acquired Type Diverticula of this class are generally accepted to be herniations of the mucosa and submucosa through congenitally weak places in the bowel wall These weak places exist at the point where the blood vessels pierce the muscle coats (Fig 251) With this background an increase in intraluminal pressure is considered adequate as an exciting factor for the initial development of the herniation The diverticula are usually multiple and as can readily be seen are composed merely of mucosa, submucosa and serosa

The greatest *incidence of diverticulitis has* been established between the ages of fifty and sixty, reaching a peak at fifty nine Thereafter a progressive decrease in the *number of cases has been observed*[21, 41] In the author's group, there were three instances between the twenty first and twenty fifth year

It is important, however, to bear in mind that diverticulitis can and does occur in the young There are references in the literature which report the disease to have occurred *in children whose ages range from nine* months to nineteen years [9 10 31 34 59 61] Probably the youngest case on record is that of an eighteen hours old infant[4] In some of these cases the lesions were situated in locations other than the sigmoid, while in others the process was definitely sigmoidal

The weight of evidence thus indicates quite clearly that while the majority of cases of diverticulitis occur in the fifth decade of life, there are exceptions to this rule which must not be ignored

Stature and Obesity Numerous efforts have been made in earlier years to relate obesity and stature to the development of *diverticulitis The results have proven of* little or no value and have been generally discarded

Anatomic Considerations The large intestine, *with the exception of the rectum* and vermiform appendix, may be easily distinguished by the three longitudinal bands or taeniae coli and the appendices epiploicae The longitudinal fibers of the muscular coat do not form a complete layer continuous all around the bowel, but are broken up into these three bands which are about one fourth inch (6mm) wide They begin at the base of the appendix and extend along the surface of the gut at nearly equal distances until the rectum is reached where they form a continuous layer of longitudinal muscle fibers Since the taeniae are one sixth shorter than the intestine, the bowel is thrown into a series of sacculations Three rows of saccules are thus produced along the length of *the bowel between the longitudinal bands* The sacculation is lost if the taeniae are dissected off, or their contractility is reduced as by anesthesia Within the bowel the saccules give rise to *pouches (haustra) separated by* crescentic folds (plicae semilunaris) which correspond to the creases on the outer surface separating the saccules The taeniae lie on the anterior, posteromesial and posterolateral aspects of the gut The appendices epiploicae lie for the most part to either side of the longitudinal band The posterolateral taenia of the iliac sigmoid passes *below* to the anterior aspect of the pelvic colon and rectum, where it unites with the anterior taenia to form a broad band The posteromedial taenia fans out in a similar *fashion* on the posterior aspect so that almost a complete longitudinal layer is present in the lower pelvic or sigmoid colon The blood vessels *of the large bowel make their en*trance from the mesentery along the mesenteric side of the posterolateral and posteromesial taenia These vessels lie somewhat *superficially beneath the serosa and* between the anterior and posterior longitudinal bands This in itself accounts for the enormous distention which is possible *in the large bowel without complete* interference of the blood supply The site where these vessels enter or leave the bowel is a common site of diverticula, because not *only is the circular muscle* defective, but an area of impaired resistance is created

ETIOLOGY

There is no unanimity of opinion as to the exact nature of the factors which enter into the development of diverticula of the bowel, although much interest and speculation have centered around their etiology

Under embryologic factors may be included the true or congenital diverticula with traction upon the walls as the bowel in its development grows away from the vessels

Anatomic Among the anatomic characteristics associated with diverticula are the narrow bowel lumen at the rectosigmoid *the horizontal plane of the pelvic sigmoid*

consistent with stasis the arrangement of longitudinal bands and lack of complete encirclement the presence of sacculations due to the shortness of the taenia as compared with the bowel a defect in the circular muscle coat created by the entrance and exit of blood vessels the presence of appendices epiploicae along the anterior longitudinal band and distention of the veins by passive congestion

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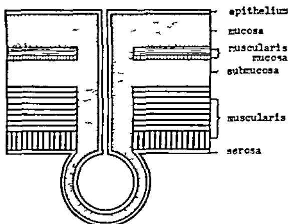


Fig 250 Schematic representation to indicate the coats of the bowel Note that only the mucosa, submucosa and peritoneum appear in the structure of the developed diverticulum

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Acquired Type Diverticula of this class are generally accepted to be herniations of the mucosa and submucosa through congenitally weak places in the bowel wall These weak places exist at the point where the blood vessels pierce the muscle coats (Fig 251) With this background an increase in intraluminal pressure is considered adequate as an exciting factor for the initial development of the herniation The diverticula are usually multiple and as can readily be seen are composed merely of mucosa, submucosa and serosa

The greatest incidence of diverticulitis has been established between the ages of fifty and sixty, reaching a peak at fifty nine Thereafter, a progressive decrease in the number of cases has been observed [1, 1] In the author's group, there were three instances between the twenty first and twenty fifth year

It is important, however, to bear in mind that diverticulitis can and does occur in the young There are references in the literature which report the disease to have occurred in children whose ages range from nine months to nineteen years [9, 10, 31, 31, 3, 61] Probably the youngest case on record is that of an eighteen hours old infant [4] In some of these cases the lesions were situated in locations other than the sigmoid, while in others the process was definitely sigmoidal

The weight of evidence thus indicates quite clearly that while the majority of cases of diverticulitis occur in the fifth decade of life there are exceptions to this rule which must not be ignored

Stature and Obesity Numerous efforts have been made in earlier years to relate obesity and stature to the development of diverticulitis The results have proven of little or no value and have been generally discarded

Anatomic Considerations The large intestine, with the exception of the rectum and vermiform appendix, may be easily distinguished by the three longitudinal bands or taeniae coli, and the appendices epiploicae The longitudinal fibers of the muscular coat do not form a complete layer continuous all around the bowel, but are broken up into these three bands which are about one fourth inch (6mm) wide They begin at the base of the appendix and extend along the surface of the gut at nearly equal distances until the rectum is reached where they form a continuous layer of longitudinal muscle fibers Since the taeniae are one sixth shorter than the intestine the bowel is thrown into a series of sacculations Three rows of saccules are thus produced along the length of the bowel between the longitudinal bands The sacculation is lost if the taeniae are dissected off, or their contractility is reduced as by anesthesia Within the bowel the saccules give rise to pouches (haustra) separated by crescentic folds (plicae semilunaris) which correspond to the creases on the outer surface separating the saccules The taeniae lie on the anterior, posteromesial and posterolateral aspects of the gut The appendices epiploicae lie for the most part to either side of the longitudinal band The posterolateral taenia of the iliac sigmoid passes below to the anterior aspect of the pelvic colon and rectum, where it unites with the anterior taenia to form a broad band The posteromedial taenia fans out in a similar fashion on the posterior aspect so that almost a complete longitudinal layer is present in the lower pelvic or sigmoid colon The blood vessels of the large bowel make their entrance from the mesentery along the mesenteric side of the posterolateral and posteromesial taenia These vessels lie somewhat superficially beneath the serosa and between the anterior and posterior longitudinal bands This in itself accounts for the enormous distention which is possible in the large bowel without complete interference of the blood supply The site where these vessels enter or leave the bowel is a common site of diverticula because not only is the circular muscle defective but an area of impaired resistance is created

ETIOLOGY

There is no unanimity of opinion as to the exact nature of the factors which enter into the development of diverticula of the bowel, although much interest and speculation have centered around their etiology

Under embryologic factors may be included the true or congenital diverticula with traction upon the walls as the bowel in its development grows away from the vessels

Anatomic Among the anatomic characteristics associated with diverticula are the narrow bowel lumen at the rectosigmoid the horizontal plane of the pelvic sigmoid

consistent with stasis, the arrangement of longitudinal bands and lack of complete en circlement the presence of sacculations due to the shortness of the taenia as compared with the bowel a defect in the circular muscle coat created by the entrance and exit of blood vessels, the presence of ap pendices epiploicae along the anterior longi tudinal band and distention of the veins by passive congestion

Physiologic Physiologic characteristics include sensitivity of the sigmoid peristal sis and spasm of circular muscle

Pathologic Pathologic symptoms are adhesions causing traction diverticula mus cle deficiency as the result of degeneration atrophic changes and avitaminosis

Physical Pulsion — increased pressure from within—and traction—pulling from without—are factors

At this time when much is being said and written on psychosomatic medicine it seems expedient to mention that Willey some two decades ago stated that he had no doubt but that there was a clo e relation ship between depressing emotions and pathologic changes of the large bowel and that in the creation of the diverticulitis a sensitive and impassioned temperament was a powerful predisposing factor Synnott[6] however observed diverticulitis to occur rarely among the insane Willard and Bockus[70] do not believe that diverticula are prone to develop in colons which are the seat of neuromuscular irritability It is true that for the most part we are dealing with theories yet there does seem to be sufficient data to state that the cause is probably a combination of factors due principally to an increased intraluminal pressure—pulsion—and a decreased resistance to the pressure created

DIFFERENTIAL FEATURES

	CONGENITAL DIVERTICULA	ACQUIRED DIVERTICULA
Number	Usually ingle	Usually multiple
Size	Larger	Smaller
Onset	Occurs at birth	Acquired later
Anatomy	Composed of all coats of the bowel	No mu cle coats

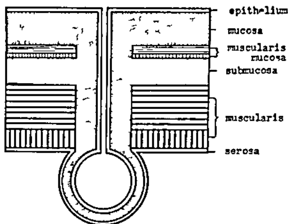


FIG 250 Schematic representation to indicate the coats of the bowel Note that only the mucosa, submucosa and peritoneum appear in the structure of the developed diverticulum

Diverticula are defects whether they are congenital—developing in utero[1] —or ac quired—developing after birth Ordinarily diverticula are classified as true (congenital) and false (acquired) the former being com posed of all the bowel coats namely mucosa submucosa muscularis and serosa and the latter being devoid of some of these coats usually the muscularis (Fig 250) This division is almost universal today and represents the accepted classification

Congenital Type Diverticula which fall into this category are usually single occur at birth and possess all the coats inherent in the parent bowel An excellent example of this type is the Meckel s diverticulum attached to the ileum about three to four feet above the ileocolic junction[30]

Acquired Type Diverticula of this class are generally accepted to be herniations of the mucosa and submucosa through con genitally weak places in the bowel wall These weak places exist at the point where the blood vessels pierce the muscle coats (Fig 251) With this background an in crease in intraluminal pressure is considered adequate as an exciting factor for the initial development of the herniation The diver ticula are usually multiple and as can readily be seen are composed merely of mucosa submucosa and serosa

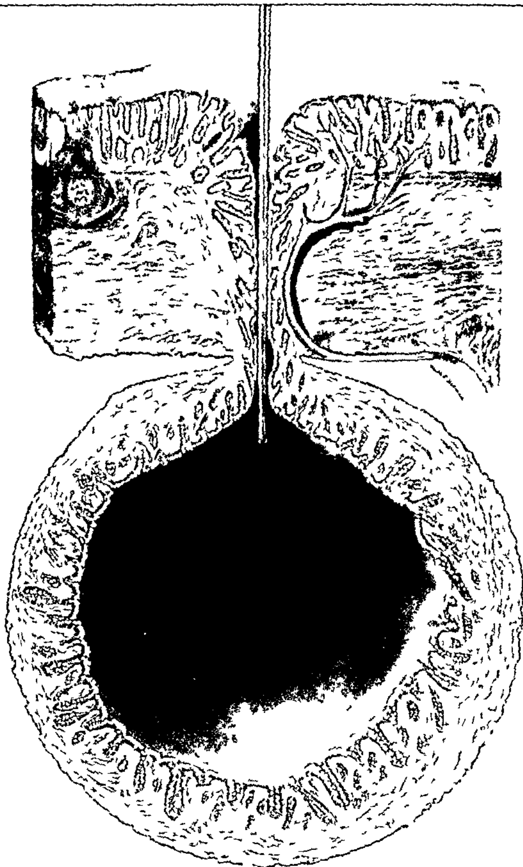


FIG 251 Schematic drawing to show the histology of the layers involved in the formation of diverticula Note that the herniation occurs at the point where the blood vessel pierces the muscle layer The probe has been placed to show the characteristic constricted neck of the diverticulum

The mechanism described by Edwards for the formation of acquired diverticula of the intestine is indeed adequate. He emphasizes the 'weak spots' in the intestinal wall at the point where the blood vessels enter it. He amplifies this by pointing out that these vascular outlets become smaller during the period of contraction of the bowel. Conversely, they become larger during the period of relaxation. If contraction of two portions of the intestine occurs with a relaxed segment between them, the bilateral pressure will force the mucosa into the enlarged vascular outlets in the relaxed segment and thus produce the initial hernia tion which may then progress to full diverticula formation as shown by Edwards (Fig 252).

As the diverticula develop, they expand into saclike structures of varying size but they retain the small point of their origin which acts like a collar. This is an important factor in the subsequent development of diverticulitis. Fecal material enters the sac through the constricted neck and is confined therein by the small opening (Fig 253). The diverticula have no muscular coat and cannot eject the offending foreign material. As a result, the foreign body becomes inspissated and stagnant, soon ulcerates the lining of the sac and sets up an infection of either a mild or severe nature.

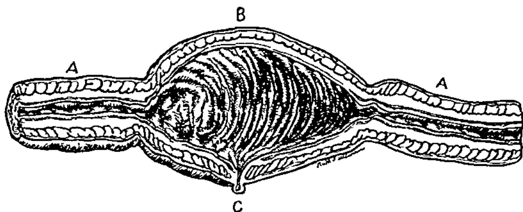


FIG 252 Schematic drawing of the mechanism of diverticula formation described by H G Edwards. The contracted segments (A A) have occurred with a relaxed segment (B) between them. The resultant increase in intraluminal pressure and the enlarged vascular opening in the relaxed segment have resulted in diverticula formation (C).

PATHOLOGY

A diverticulum is a bottle shaped process presenting a narrow neck and body or sac.

PATHOLOGY OF DIVERTICULITIS

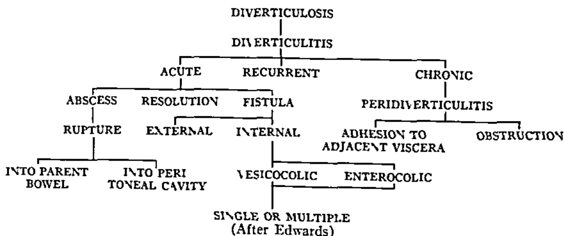




Fig 253 Acute perforated diverticulitis Note the extreme edema and evidence of inflammation of the wall of the bowel (S A Linde and O B Hunter)

In the congenital variety the wall of the diverticulum is composed of all the layers of the wall of the bowel, whereas in the acquired type there is a thinning out or absence of the circular muscle layer causing herniation of the mucosa and submucosa through the muscle The number is variable ranging from one to several hundred Ordinarily they are almost spherical in shape, measuring in diameter approximately 2 mm at the neck and from 6 to 10 mm at the body Diverticula of very large size have been reported They are to be found from the pharyngo esophageal articulation to the anorectal line although the sigmoid portion of the colon is the favored site Approximately eighty five per cent of diverticula are found in the sigmoid Only in rare instances is the rectum involved although several cases have been cited in which this has occurred

The pathology of diverticulitis is essentially the pathology of inflammation and infection Any stage may be encountered from a mild inflammation to gangrene Abscess formation perforation, peritonitis fistula formation into adjacent organs and obstruction from sigmoiditis and peridiverticulitis may be anticipated [1 3] The initiation of inflammatory secondary changes depends upon retention of fecal material in the diverticula It is axiomatic that this should occur most frequently in the sigmoid because the fecal stream is more solid in that location than elsewhere in the gastro intestinal tract The pathologic changes incident to diverticulitis have been listed in the preceding diagram The most common lesion encountered is an inflammatory process localized in the diverticula All of the elements of inflammation are present, producing a picture not unlike that seen in acute appendicitis In addition, there is a characteristic extension of the inflammatory process for a variable distance in the wall of the bowel The inflammation may subside

under nonsurgical care and undergo resolution or it may progress to the formation of an abscess The abscess may remain static until relieved by operation or it may rupture (Fig 253) If it ruptures into the lumen of the bowel to which it is attached, adequate drainage may result, with a corresponding spontaneous cure If it ruptures into the peritoneal cavity, peritonitis with its attendant complications will ensue It may be timely at this point to mention the possibility of rupture of an inactive diverticulum when the host is exposed to high altitudes One case recently brought to our attention suffered this type of accident while flying in a commercial plane Operation revealed a rupture diverticulum No history of previous diverticulitis was available [71] Advances in commercial aviation including the proposed sealed cabin to eliminate excessive pressures, will provide the solution of this problem It is of extreme interest, however, to correlate the influence of high altitude pressure on diverticula with our conception of the pressure theory of its etiology

Extension of the inflammation into adjacent organs is fortunately rare The resultant fistula usually involves the urinary bladder because of its anatomic proximity Many detailed reports on this condition are to be found [39, 41, 43, 5, 62, 66, 69, 71] It may however involve a neighboring loop of bowel or it may diverge laterally and forward in the iliac fossa to open ultimately on the skin of the left lateral quadrant of the abdomen The latter extension is quite rare however The fistulae seen in this location usually follow an operation for the drainage of an abscess particularly when the openings of the diverticula have not been adequately eliminated

The recurrent type of diverticulitis may follow a previously acute process which has undergone spontaneous resolution indicating a reinfection of the diverticula Similarly recurrence may follow the closure of a colostomy which had been previously established for its cure For many years a remote colostomy, usually in the transverse colon, was considered adequate therapy for acute diverticulitis The colostomy was maintained until all evidences of inflammation had disappeared and proctoscopic examination was normal The colostomy was then closed More recently, a fairly large percentage of the cases so treated returned with a recurrence of their diverticulitis As a result, ultimate reliance is no longer accorded colostomy alone It is now considered merely a valuable preliminary adjunct to resection [43, 60]

The predominant feature of chronic diverticulitis is a fibrotic infiltration of the wall of the diverticula and the parent sigmoid As a result the bowel wall becomes thickened and encroaches on the lumen Ultimately complete obstruction may ensue The fibrosis extends for a varying distance above and below the original diverticula, and in tapering off produces a sausagelike or spindle shaped mass which is considered to be characteristic of chronic diverticulitis [3, 61] As such it is used as an aid in differentiating it from the short, abruptly demarcated lesion of carcinoma, although both may occur coincidentally (Fig 254) Fibrous adhesions not infrequently form around the lesion and attach themselves to the adjacent viscera Acute inflammatory processes may form in the fibrotic wall of the bowel (peridiverticulitis) or in the mass of adhesions The likelihood of their rupture however, is small and they are usually discovered at operation or necropsy

SYMPTOMS

Diverticulosis

It is almost universally accepted that uncomplicated diverticulosis produces no symptoms As a result, a clinical diagnosis is often impossible Willard and Bockus [71] studied the condition with care and arrived at a syndrome which they believe manifests diverticulosis The syndrome includes an intermittent diarrhea alternating with epi



Fig 254 Acute perforated diverticulitis (A) and coincidental adenocarcinoma of the sigmoid (B) (S A Linde and O B Hunter)

sodes of constipation epigastric pain or distress, flatulence and occasionally generalized abdominal pain The value of this syndrome remains to be proven It parallels too closely the symptoms attributable to any unstable colon to be recognized as pathognomonic of diverticulosis If these symptoms become more definite they are probably due to a mild degree of diverticulitis, rather than diverticulosis since it is manifestly impossible by clinical means to rule out a small hidden, infected sac

Diverticulitis

In diverticulitis the symptoms vary in direct proportion to the severity and extent of the inflammatory process Pain in the left lower abdominal quadrant low grade fever slight leukocytosis, flatulence, disturbed bowel function—such as constipation or diarrhea—a palpable, tender sigmoid, nausea and pneumaturia are the composite cardinal symptoms[37] In our group of 104 private patients, the following symptoms were cited

Symptom	No Cases	Percentage
Pain (abdominal)	84	80.7 per cent
Constipation	43	0.1 per cent
Diarrhea	11	10.5 per cent
Constipation alternating with diarrhea	13	12.5 per cent
Bleeding	17	16.3 per cent
Palpable mass in sigmoid (noted by patient)	20	19.2 per cent
Pneumaturia	16	15.3 per cent
Total	104	

Pain This symptom is usually present in the left lower quadrant It is comparable to the sensation accompanying appendicitis and is a fairly constant complaint It may vary from a slight discomfort to severe colic The latter is due to an associated spasm of the bowel musculature The site of the pain *does not always correspond* with the location of the maximum diverticular pathology, as revealed by the roentgenogram It does, however, correspond very often with the points of greatest muscle spasm As a rule, the pain is characterized as a dull ache in the left lower quadrant which may be referred to the back

Constipation and Diarrhea In a study of 104 cases of diverticulitis, 72 gave a definite history of constipation (72 7%), 14 gave a history of diarrhea and 11 reported constipation alternating with diarrhea The symptom complex however, is not specific and is too unreliable for pertinent diagnosis

Fever Chills Leukocytosis These factors are merely indicators of the degree of infection They occur more particularly in acute diverticulitis and its complications and may be absent in the chronic (fibrotic) form

Nausea and Vomiting In the presence of abscess and peritonitis nausea and vomiting are not uncommon In obstruction due to chronic diverticulitis, they may appear as late symptoms

Blood and Mucus The passage of blood from the bowel in diverticulitis is an inconstant factor It has been reported in widely separated clinics to have occurred in from 7 to 20 per cent of the cases investigated[3 45 1 61] The degree of bleeding has varied from a slight amount to massive hemorrhage[1 38] Some of our more competent observers ascribe little significance to it preferring to believe that proctoscopic examination will reveal other causes for the sign[3 8] They do admit however, that bleeding has occurred in some of their cases for which they could find no other explanation despite the most careful study Other observers equally competent have adopted the view that rectal bleeding when it cannot be accounted for by an associated lesion may be regarded as a symptom of diverticulitis[1 4 60 61] The mechanism of the bleeding is unknown One report suggests that it may be due to a ruptured vessel in the thinned wall of the diverticula That theory is however didactic rather than practical *It is the view of Linde and the* author[6] that while the hemorrhage in diverticulitis is neither a predominant nor constant factor it would be unwarranted to disregard it entirely The appearance of mucus in the stools has been noted in a small percentage of cases It is no more characteristic than the mucus associated with constipation and occurs too infrequently to be endowed with any diagnostic significance

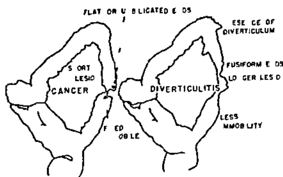


Fig 255 Diagrammatic summary of contrasting radiologic findings in obstructions due to diverticulitis and cancer of the large bowel (C Rosser)

Tenderness and Abdominal Rigidity In most cases of diverticulitis these signs are usually present in the left lower quadrant of the abdomen directly over the lesion Occasionally they may reach their maximum intensity over the area of associated colonic spasm The degree of tenderness and muscular rigidity is increased with the development of an abscess and becomes generalized in the event of perforation and peritonitis

Tumor Mass Palpation of a tender mass in the left iliac fossa is a fairly reliable sign of diverticulitis but in approximately 80 per cent of cases no mass can be felt It is usually sausagelike or spindle shaped immovable and quite tender, and must be differentiated from carcinoma

Symptoms of Fistula Formation There are no specific symptoms to indicate either an imminent or actual fistula into a neighboring loop of bowel The established fistula is usually uncovered by the roentgenogram or by operation A fistula into the urinary bladder, on the other hand will usually serve premonitory notice of its presence A history of pain frequency burning and nocturia warns of adhesion to the bladder

The passage of flatus on micturition is strong presumptive evidence that a colovesical fistula is present When the fistula

becomes established, the urine will become foul, and a progressively severe cystitis develops The presence of fecal material in the urine has been noted in a few of our cases

DIAGNOSIS

The diagnosis of diverticulitis is not always simple The symptoms, already enumerated, vary widely in their intensity and one or more of the signs may be absent The opaque enema provides the most reliable means of establishing a diagnosis Eggers[23] has declared that "the most valuable symptom is to bear a diagnosis of diverticulitis in mind" Rosser's[61] diagnostic formula is apt he declares that a combination of low grade temperature, tenderness in the left lower quadrant with or without the presence of a palpable mass, and sigmoidoscopic evidence of fixation of the lower colon, especially in an individual over 50, are indications that careful radiographic studies of the colon are in order

Proctosigmoidoscopy In recent years more frequent and efficient use of the sigmoidoscope has yielded considerable diagnostic information A group of signs has been evolved for the recognition of diverticulitis which has proved of value Buie[14, 1] found it possible through the use of these signs to diagnose the lesion in one hundred and sixty cases (66%) successfully The signs include the following

1 Limited mobility of a segment of the bowel associated with limited mobility of the adjacent structures

2 Angulation of the bowel When present, this feature occurs at the point where the inflammatory process immobilizes the colon and it is practically impossible to pass the instrument beyond it

3 Reduced lumen and adherent mucosal folds The former is due to contracture of the fibrous tissue which has infiltrated the wall of the bowel It follows inevitably that as the contraction progresses the mucous folds are crowded together and become adherent It is not unusual for the folds to become edematous

4 Sigmoidal sacculation These are represented as shallow pouches or depressions which may extend partially or completely around the wall of the bowel In a mobile sigmoid which bears no evidence of inflammatory disease, ridges separating the pouches can often be seen They may represent a prediverticular state and are best visualized when the bowel is distended with air A similar observation was made twenty years prior by Spriggs and Marxer[65] They studied a large series of roentgenograms of the colon and described a "prediverticular state" in which normal segmentation of the bowel was replaced by a "ragged outline of little convex irregularities"

5 Actual view of the openings of the diverticula through the sigmoidoscope While these signs may be seen separately, they usually occur in combination It may not be possible to make a definite diagnosis by the use of them alone except when the diverticula are actually visualized When they are found, however they indicate the presence of diverticula

Roentgenography The barium enema is the most accurate and effective diagnostic agent at our disposal Its greater use today is responsible for the markedly increased number of patients in whom the lesions are now demonstrated While the opaque meal may show the diverticula in the colon, it is not as efficient as the opaque enema Consequently, the barium enema is now used almost universally either alone or followed by the injection of air The latter, or double contrast method is preferable in that it gives the diverticula a more positive outline

It is of vital importance however to realize that the barium enema is not infallible By reason of spasm or orificial constriction the barium may not enter the sacs and a negative report will result If the symptoms persist, re examination should be insisted upon It is equally vital to realize that a roentgenogram in one position may fail to visualize the lesions while another angle may demonstrate them with great

clarity The most effective routine should include anteroposterior left oblique and right oblique views In the prediverticular state, the roentgenogram will usually show replacement of the normal segmentation of a small portion of the sigmoid by a unilateral, ragged, irregular, saw toothed marginal outline (Fig 256) In the same film all of the stages of diverticulosis may be demonstrated Large sacculations may be clearly visualized and may assume widely divergent shapes and groupings Some appear round others ovoid and still others semiglobular They may occur singly or in oddly patterned groups They may appear as a chain of opaque dots in a double row connected with the lumen of the bowel by short narrow necks When fecal concretions are present the barium will fill the sacs around the foreign body and produce a variety of shapes such as crescents and finger like shadows The deep indentations of the bowel haustra indicate spasm and are interpreted either as evidence of the existence of a prediverticular state or irritability due to an associated inflammatory process In the chronic obstructive type with tumor formation a filling defect which stimulates carcinoma may be visualized[16, 63] The differential diagnosis is often difficult and on occasion cannot be made with any degree of certainty According to Feldman,[76] there are a few roentgen signs that may give the clue to the true nature of the condition (1) the mucosal relief view of the colon does not show as complete destruction of the mucosa in diverticulitis as is found in carcinoma (2) the picture in malignancy is constant while in diverticulitis the defect as well as the tumor has a tendency to change (3) in diverticulitis the obstruction is usually incomplete and occurs as a late manifestation (4) the defect in diverticulitis is usually fusiform or spindle shaped and is longer than the short abruptly demarcated lesion of carcinoma

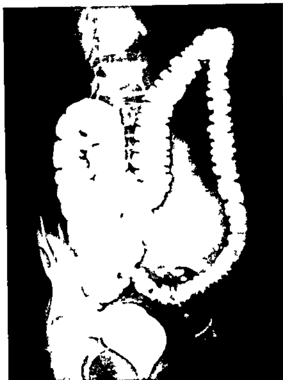


Fig 256 Diverticulosis The irregular sawtooth margin of the sigmoid is well marked Other small diverticula can be seen in the left colon

Not infrequently the rising column of the opaque enema may be seen to halt abruptly and no more of the solution can be introduced The presence of an obstructive lesion is apparent but a differential diagnosis from the film is impossible A roentgenogram following the oral administration of barium would probably yield invaluable information but such is a dangerous practice because it may aggravate the existing obstruction For this reason an opaque meal is never utilized in the presence of an impending obstruction In recent months however, Wyatt[74] has developed a technic for the oral administration of barium which he feels eliminates this danger By adding magnesium citrate to it he has been able to produce an opaque medium which will maintain its liquid state permanently As a result its administration orally does not result in impaction proximal to the lesion This method has been employed by Linde in several cases with gratifying results A detailed report of the technic will appear in the literature in the near future

TABLE 17 DIFFERENTIAL DIAGNOSIS, ACUTE DIVERTICULITIS

EXAMINATION	ACUTE DIVERTICULITIS	ACUTE APPENDICITIS	URINARY CALCULI	PELVIC INFLAMMATORY DISEASE
Previous history	None*	None	None*	History of exposure
Age	55 60*	Youth*	Any age	Young adult*
Site	Left sided	Right sided	Either side	Bilateral*
Fever	Low grade	Low grade	None*	High
Pain	Moderate*	Moderate*	Colic	Severe*
Tenderness	Moderate*	Moderate*	Moderate*	Severe
Nausea and vomiting	Negative*	Positive	Positive*	Negative*
Rectal bleeding	May be positive	Negative	Negative	Negative
Abdominal tumor	May be positive	Negative	Negative	Negative*
Urinalysis	*Negative*	*Negative*	*Blood and pus*	*Negative*
Vaginal smear	Negative	Negative	Negative	Gonococcus
Pelvic examination	Negative	Negative	Negative	Bilateral tender mass
Sigmoidoscopic examination	May show five diagnostic signs (see text)	Negative	Negative	Negative
Cystoscopic examination	Negative	Negative	Positive	Negative
Roentgenogram	Positive for diverticula	Negative	Positive for calculus	Negative

*—*usually* (*Prepared by S A Linde*)

TABLE 18 DIFFERENTIAL DIAGNOSIS, CHRONIC DIVERTICULITIS

EXAMINATION	CHRONIC DIVERTICULITIS	SIGMOID CARCINOMA
History of previous attacks	*Positive**	*Positive**
Fever	Low grade*	None
Pain	Positive	Negative*
Tenderness	Moderate or severe	None*
Abdominal mass	55% of cases	55% plus
Cachexia	Less severe	More severe
Sigmoidoscopic examination	May show limited mobility angulation reduced lumen sacculation and internal openings of the diverticula	Shows tumor formation *
Roentgenogram		
a Filling defect	Longer and spindle shaped	*Short and abruptly demarcated*
b Mucosal destruction	None	Considerable
c Variability	Defect and tumor has a tendency to change	Constant
d Degree of obstruction	Incomplete*	Complete*
e Other signs	Additional diverticula	Solitary lesion

*—usually (Prepared by S A Linde)

Colovesical and enterocolic fistulae may be visualized by the passage of the opaque solution from the sigmoid into the adjacent loop of bowel or into the urinary bladder The tracts are not always distinct, particularly in the enterocolic fistula In the colovesical fistula, the more common of the two the tract is more easily visualized by

cystoscopy, cystography using indigo carmine and sigmoidoscopy

Association of Diverticulitis and Carcinoma Early observers were of the opinion that diverticulitis was a predisposing factor to the development of carcinoma of the intestine The prevailing opinion at present is at variance with that belief Ochsner and Bargen [1] found malignancy of the colon in only 6 per cent of their cases in whom diverticula were known to exist (thirteen cases) In only seven of these was malignancy found in the same portion of the colon in which the diverticula were situated Rankin and Brown [7] found carcinoma in only four of 227 cases of diverticulitis and concluded that the relationship between carcinoma and diverticulitis was incidental rather than actual Since both diverticulitis and carcinoma of the intestine occur in the latter decades of life in the majority of cases it is reasonable to expect some percentage of coincidental involvement either in the same area or remotely situated (See discussion in Chap 19 Malignancy p 688)

Differential Diagnosis

The differential diagnosis of acute diverticulitis is shown in Table 17 and of chronic diverticulitis in Table 18

PROGNOSIS

The prognosis in diverticulosis is uniformly good While most of these cases remain asymptomatic approximately 15 per cent of them will suffer the transition to diverticulitis When this occurs the prognosis will become progressively worse in direct proportion to the severity and extent of the inflammatory process Extensive surgery which may be required provides an additional prognostic risk

TREATMENT

The treatment varies with the type and degree of inflammatory involvement In diverticulosis and uncomplicated diverticulitis the management is medical, designed toward keeping the diverticula empty



Fig 257 Organic lesion of sigmoid demonstrated by opaque enema Diverticulitis with stricture formation

Nonsurgical

Diet A bland, nonirritating diet free of residue is advocated All fruits with seeds should be avoided Rough raw or stringy vegetables are similarly undesirable Fish should be fillet and all bones carefully removed If constipation becomes troublesome as a result of the diet fruit juices may be taken in more liberal quantities Alcohol may be used in moderation

Bland Low Residue Diet

Breakfast
- Orange juice
- Eggs two (2)
- Cream of wheat
- Toast one slice (1)
- Butter
- Cream
- Milk
- Decaffeinated coffee or tea

Dinner
- Minced chicken or lamb or broiled fillet of sole
- Pureed string beans
- Pureed carrots
- Diced potato



FIG 258 G R, age 61 Diverticuli demonstrated by opaque enema Inconstant defect of sigmoid Resection, however, disclosed a diverticulitis and peridiverticulitis with stricture formation (Removed specimen seen in Plate 5) Patient out of bed on the seventh day and discharged on the eleventh day after operation

Toast — one (1) slice or two (2) crackers
Butter
Milk
Cream
Decaffeinated coffee or tea
Strained stewed fruit or junket or custard

SUPPER
Cream of celery soup—strained
Asparagus on toast
Pureed beets
Cream cheese
Crackers — two (2) or one (1) slice of toast
Butter
Milk
Cream
Decaffeinated coffee or tea
Plain cornstarch pudding

USE
Soft, bland foods
All vegetables and fruits pureed
Soups—Cream soups—strained
Cereals—Oatmeal rice, cream of wheat, barley, corn meal
Fruits—Strained stewed fruits, orange juice, grapefruit juice
Vegetables—Pureed spinach, carrots, peas, squash
Cheese—Any kind
Desserts—Rice, tapioca, cornstarch gelatin, puddings custards, junkets
Beverages—Milk, buttermilk, fruitades, tea and coffee—very weak, if used at all

AVOID
Fruits and vegetables with seeds
Rough and uncooked vegetables
Fish with bones

Cathartics Irritative cathartics should be avoided The hyperperistalsis produced has a tendency to aggravate the existing inflammatory lesion Mineral oil should be used in liberal quantities short of anal leakage Other paraffin preparations without any added cathartic may be employed

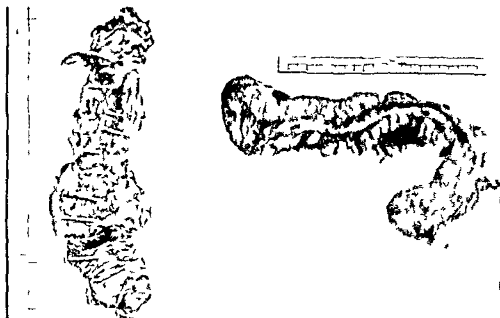
Irrigation of the lower bowel may be employed in the quiescent stage of diverticulitis, for the purpose of preventing acute attacks Warm olive oil is recommended Colonic irrigation, however, should be avoided at all times because of the danger of perforation

Drugs Belladonna and its derivatives are helpful A reliable combination is tincture belladonna M iii and tincture hyoscyamus M iii in water thrice daily before each meal Similar antispasmodics, such as trasentine, preferably with phenobarbital, are useful in overcoming the associated spasm Chemotherapeutic and antibiotic agents have not been employed exclusively in a sufficient number of cases to date to estimate their true value

SURGICAL TREATMENT

There is common agreement that a good proportion of patients suffering with diverticulitis will respond to nonsurgical means Too, there is little difference of opinion that the complications of this disease entity require surgical intervention Of these may be mentioned peridiverticular abscess perforation, fistula and obstruction More than occasionally it is impossible to distinguish between malignancy and diverticulitis for

PLATE 5



(*Left*) Specimen showing wooden applicator sticks in diverticulous sacs Removed by end to end aseptic anastomosis (*Right*) G R age 61 Sigmoidal diverticulitis extirpated by Hartmann procedure Abdominal colostomy subsequently transplanted to anus with preservation of anal sphincters

which reason exploration under such a circumstance is justifiable

Colostomy It is recognized that the establishment of a stoma proximal or orad to the involved segment of bowel is followed by improvement of the symptomatology as a result of subsidence of the inflammatory process This amelioration of symptoms may be but temporary and of varying degree Anxiety of patients for closure of their colostomy becomes manifest and is frequently difficult to postpone Certainly an interval of several months with irrigations through a completely defunctioned bowel and the employment of antibiotic and chemotherapeutic measures should be resorted to before closure is contemplated

Unfortunately there exists no definite criterion by which one may determine the precise time closure should be effected or that recurrence of symptoms will not develop Ordinarily it may be reasonably safe where the patient has been completely symptom free for a period of several months and regression of the process with restoration of the bowel lumen as evaluated by roentgenologic and sigmoidoscopic examination is noted It is worthy of mention that in Pemberton s series [3] less than one third of their cases achieved satisfactory relief following closure of the colostomy

Resection In our opinion removal of the diseased segment of bowel is indicated in the presence of recurring symptoms following complete proximal defunctionalization and the use of sulfonamide as well as antibiotic therapy where fistula exists and where malignancy is indeterminate While patients with sigmoidal diverticulitis and its concomitant complications must be individualized and no single procedure can be arbitrarily accepted to suit the requirements of every case the exteriorization method as designed by Mikulicz and Paul[47, 5] and modified by Rankin[56] may be found particularly applicable During the past decade there has been a definite trend toward resection with immediate establishment of continuity While such a maneuver alone serves to eliminate much of the invalidism associated with multiple stage procedures there is seldom an instance where it can be employed here without risk, unless defunctionalization has been instituted previously

Management of Complications Peridiverticular Abscess This is by far the most common complication Laparotomy and drainage is conservative and at the same time usually satisfactory Any attempt to exteriorize the involved segment invites additional risk and is not to be recommended

Acute Perforation Immediate operation is indicated where the diverticulum perforates into the peritoneal cavity Ordinarily a left inguinal muscle splitting incision will provide adequate exposure The perforation should be located and closed While it is true that in many instances small perforations become sealed spontaneously, the larger ones do not Consequently obliteration of the perforation is the more rational procedure If the opening of the diverticulum cannot be located in the inflammatory mass a flap of omentum may be sutured over the area most likely to contain it A Babcock metal sump drain or other suitable drains should be placed in the left lateral iliac gutter in the pelvis or in both sites In two instances we resigned ourselves to the more conservative measure of introducing a Babcock drain beside the perforated area Both healed spontaneously The simultaneous establishment of a transversostomy is advocated

Fistula Extension of the inflammatory lesion of diverticulitis into an adjacent organ, usually the urinary bladder, is a serious complication Fortunately, however it is not too common The treatment of sigmoidovesical fistula is surgical The establishment of a proximal double barrelled colostomy is a short circuiting procedure that is justifiable This is especially true in the presence of associated abscess formation, where severe unrelieved symptoms pertinent to the bladder exist, and as a preliminary stage to resection



Fig 259 T M Segment of sigmoid showing extensive diverticulitis and malignancy Resection performed by Hartmann technic

In performing the colostomy it is important to separate the two loops of bowel in order to prevent 'spill over' of the intestinal contents Cave[1] and others[19, 41] recommend diversion of the fecal stream prior to removal of the involved segment with its adjacent fistula Our usual plan is to establish a transversostomy of the Wangensteen or Devine type Following a period of daily irrigation with sulfathalidine in suspension form through the lower (distal) loop to permit the inflammatory process to subside resection is then performed Urethral drainage is instituted prior to resection while suprapubic drainage is established at the time of resection The Mikulicz exteriorization procedure with partial cystectomy appears to be ideal because of its safety Anterior resection, properly termed anterior excision after the method of Hartmann[33] with partial cystectomy is less satisfactory although this procedure has been employed successfully in four of our cases[7] The writer is convinced that an immediate end to end anastomosis and cystectomy is unnecessarily formidable and therefore a poor choice

Obstruction This complication calls for bed rest and the parenteral administration of fluids If small bowel distention supervenes, intestinal intubation should be instituted In the presence of acute colic obstruction, surgical decompression is indicated The author s choice has been appendicostomy or cecostomy, while in chronic obstruction a transversostomy is preferred

In our group of 104 patients with diverticulitis, 32 were submitted to operation A palliative procedure was performed in eleven as shown in Table 19

Table 19 Operative Cases of Diverticulitis without Resection

Operation	No Cases	Deaths	Mortality
Colostomy for obstruction	5	1	20 per cent
Incision and drainage of abscess	3	1	33⅓ per cent
Drainage for perforation without closure	2	0	0
Exploration only	1	0	0
	11	2	18 1 per cent

Table 20 Operative Cases of Diverticulitis Including Resection

Type of Resection	Number of Cases	Deaths	Mortality
Exteriorization (Mikulicz)	6	0	0
Abdominoperineal proctosigmoidectomy	2	0	0
Abdominoperineal proctosigmoidectomy with hemicolectomy	1	0	0
Primary end to end anastomosis	6	1	16 6 per cent
Anterior resection (excision) with colostomy and exteriorization of closed rectal stump (partial cystectomy in four)	6	0	0
Total	21	1	4 7 per cent

Of the eleven cases operated upon but not resected, there were two deaths one following colostomy for obstruction and the second after incision and drainage for an abscess making a mortality of 18 1 per cent

Resection was carried out in twenty one instances usually with some type of proximal colostomy prior to operation Six were

performed by the exteriorization method of Mikulicz, three by abdominoperineal proctosigmoidectomy and six by end to end aseptic anastomosis In six patients anterior resection of the sigmoid with permanent colostomy and extraperitonization of the closed rectal stump (Hartmann technic) was done with partial cystectomy in four instances

Of the twenty one cases resected, there was one death—a mortality of 4 7 per cent This occurred as the result of peritonitis following resection with end to end anastomosis

An interesting case is that of a man who would ordinarily have been left with a permanent colostomy He is one of ten cases in whom as a one stage procedure, a hemicolectomy was performed in conjunction with proctosigmoidectomy and the transverse colon transplanted to the anus with preservation of the sphincter muscles[17 4*] This patient was unable to pursue his occupation as a glass blower because of his colostomy He was given a conception of the risk involved and an effort was made to have him change his vocation He insisted on operation possibly because he was a successful glass blower and it was rather late in life for him to learn a new business



Fig 260 G R age 61 Diverticulitis Hemicolectomy and proctosigmoidectomy with transplantation of transverse colon to anus with preservation of the sphincter muscle

G R No 100651 a 61 year-old male was seen after he had had abdominal cramps, fever and moderate constipation for two



Fig 261 F S (*Left*) Diverticulitis of sigmoid—end to end aseptic anastomosis (*Right*) Extensive diverticulitis of sigmoid Sigmoidectomy performed patient discharged on the fourteenth day after operation Tissue suggestive of concomitant lues

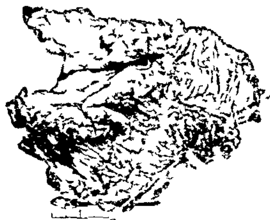




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Resection was carried out in twenty one instances, usually with some type of proximal colostomy prior to operation Six were

tion of the sigmoid with end to end anasto mosis in one stage, as was performed here

F S (B 4655), A white male aged 46 was referred in February, 1942, because of abdominal pain, loss of weight and general



Fig 264 J S Diverticulitis of sigmoid removed by proctosigmoidectomy

malaise The patient stated that he had ex perienced intermittent cramplike pain in the left lower quadrant during the previous four or five weeks Prior to this period a dull ache in the abdomen was present which appeared to be relieved by evacuation and the passage of flatus Incomplete elimination was cited Bleeding bright red in color, sparse in amount intermittent and occurring at the time of bowel movement existed over a two year period A loss of thirty pounds in weight was reported

Past History Fistulectomy and appen dectomy during youth Venereal infection denied Family history irrelevant Examina tion disclosed large internal hemorrhoids and immovability of the rectosigmoid Elicitation of increased resistance in left lower abdominal quadrant The patient was admitted to Temple University Hospital with a diagnosis of carcinoma of the sigmoid Diabetes and syphilis (Wassermann and Kolmer 4 plus) were found and therapy instituted by the re spective departments Opaque enema study No 48553 was reported—"An organic lesion is demonstrated that is manifested as an exten sive stenotic lesion of the proximal end of the sigmoid Since a number of diverticula are visualized in the area of narrowing we natu rally consider the lesion to be on the basis of diverticulitis We cannot absolutely rule out malignancy" Repeated sigmoidoscopy elicited no additional information, and on March 5, *1942, the patient was submitted to opera* tion Exploration elicited a large indurated mass adherent to the left pelvic gutter and fixed to the bladder The author was not certain even after palpation whether malig nancy existed Mobilization was begun which necessitated resection of a small portion of the bladder The latter was closed and the sigmoidal mass resected with an immediate aseptic end to-end anastomosis A Babcock sump drain was placed in the pelvis and the abdomen closed

The pathologic report (No 33905) stated The specimen is a segment of large bowel 15 cm long The wall is thickened by fibrous tissue and edema The diverticular tract is lined by chronic granulation tissue The latter reveals numerous newly formed vascu lar channels proliferative fibrosis pigmenta tion of old hemorrhage and infiltration by all types of inflammatory cells including lym phocytes plasmocytes large mononuclear phagocytes eosinophils and neutrophils The wall shows dense fibrosis and focal aggrega tion of lymphocytes and plasmocytes The former are grouped in typical follicle forma tion Because of the predominance of plasma cells we would be interested in knowing the blood Wassermann on this patient There is no evidence of malignant neoplasia Diag nosis chronic diverticulitis of sigmoid (pos sibly luetic)

The postoperative course was uneventful



Fig 262 E McL, age 61 Opaque enema study disclosing evidence of diverticulitis of sigmoid Figure 264 shows specimen with wooden applicator sticks in diverticulous sacs Removed by end to end aseptic anastomosis



Fig 263 T L, age 65 Widespread diverticuli throughout transverse descending and pelvic colon These vary in size and occur diffusely with marked cluster formations Zonal spasms and irritability are disclosed Colectomy performed

weeks He had been treated conservatively in his local hospital and had recovered to the extent that he was ambulatory On physical examination there was tenderness and a suggestion of a mass in his left lower abdomen A barium enema disclosed diverticulitis of the sigmoid and lower descending colon Operation disclosed a markedly strictured and indurated sigmoid and lower descending colon which were covered with a mucinous exudate The rectosigmoid the sigmoid and a portion of the descending colon were excised The small rectal stump was closed and buried beneath the peritoneum of the pelvic floor The end of the descending colon was brought out as a single barrelled colostomy The pathologist reported a markedly strictured and thickened colon which contained multiple diverticuli and intramural abscesses The lumen was markedly narrow The patient's convalescence was not unusual He returned to work but was unable to perform his duties as a glass blower because of his colostomy He insisted on having it closed and the continuity of his intestinal tract restored His second operation, an abdominoperineal procedure, consisted of the excision of his rectal stump and the remainder of his descending colon The operation was completed at the same time by transplanting the transverse colon to the anus with preservation of the sphincter mechanism [8] After an uncomplicated convalescence the patient was discharged from the hospital on his 14th postoperative day Two months after the second operation he returned to his usual occupation The sphincter control is described by the patient as entirely normal

As mentioned previously, the differential diagnosis between diverticulitis and malignancy is not always an easy one even at the time of operation This is clearly evidenced in the following case report Of unusual interest is the possibility of a superimposed luetic process Fortunately this patient progressed in a satisfactory fashion, although we do not recommend resection of the bladder, suprapubic cystostomy and resec

46 Mayo W J Wilson L B and Giffin H Z Acquired diverticulo es of the large intestine Surg Gynec & Obst 5 8 190
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5? Paul F T Colectomy for rectal cancer Brit M J 1 1136 1895
53 Pemberton J de J Personal communication to Ros er C (38) Virginia M Monthly 70 433 435 1943
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Wybert A Arch argent 17 480 194?

The patient was permitted out of bed on the ninth (3 14 1942) and discharged from the hospital on the fourteenth (3 18 42) post operative day A small wound infection was found at the site of the drainage tube which responded to local measures

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CHAPTER 11

Lymphogranuloma Venereum

This disease which has gained general recognition but comparatively recently, is of interest mainly in its rectal manifestations the anorectal syphiloma of Fournier or rectal stricture and anal esthiomene An intelligent study of this syndrome however requires a fairly inclusive comprehension of the disease in general for this reason, a summarized description follows, comprising an introduction to the chapter on Inflammatory Stricture

SYNONYMS

The tortuous course this disease has taken in tracing its evolution through the history of medicine is indicated to some degree in the unusual number of names that have been applied to it at one time or another in one country or another They imply a lack of agreement among scientists, owing perhaps merely to the fact that they have been working more or less independently, as to the nature etiology manifestations and significance of this condition The principal ones, arranged roughly in the order of their historical usage are strumous bubo, strumous bubo of the groin, non venereal bubo, *nontuberculous lymphadenitis* climatic bubo, tropical bubo, ulcere simple adogene des parties genitales pora denolymphite suppuree benigne forme septicemique, poradenitis inguinalis acuta symphonadenopathia inguinocruralis epidemica lymphogranulomatoser Schanker, Nicolas Favre s disease, fourth venereal disease, sixth venereal disease lymphogranulomatosis inguinalis subaigue, lymphogranulomatosis inguinalis, lymphogranuloma inguinale lymphopathia venereum A study of these titles will evidence the predominance of the main characteristics of the disease, which finally triumphed in the selective classified cognomen by which it is now most generally recognized

DEFINITION

Lymphogranuloma venereum is an infectious disease usually of venereal origin caused by an unknown filtrable virus and characterized in the male by a somewhat insignificant initial lesion[27, 100] which is followed by a suppurative inguinal adenitis, elephantiasis of the penis and scrotum and, less frequently, stricture of the rectum in the female by stricture of the rectum abscess, fistulae anovulvar esthiomene and elephantiasis[67]

The classification of the disease into the inguinal and anorectal type is generally accepted, but, contrary to general belief,

*lymphogranuloma venereum does not con*sist of these 2 types alone Hellerstrom and Wassen[91] recognized 53 primary lesions in 100 cases of the disease Sezary and Drain[1 9] discovered 39 initial lesions in 73 cases Heymans[8] stated that the primary manifestations of lymphogranuloma venereum were not fully described in the literature, because early lesions were not usually seen

STAGLS

Primary le ion { a Incubation period; b Site—male female; c Appearance and types }
Adenitis or suppurative stage
Sequelae—lymph stasis elephantiasis esthiomene and rectal stricture

Primary Lesion

Incubation Period This varies but the most generally accepted period is from five days to two weeks after coitus with an infected partner [7] The extremes reported are three days [3] and thirty days One reference[73] gives this period as varying from 7 to 80 days 29 days average with one unusual case of 4½ months Uncertainty as to this period may be explained by the small size and painlessness of the lesion and in addition in the female by the obscurity of the site Four weeks after infection is the average time for the appearance of the initial lesion although conditions occurring as early as 5 days and as late as several months have been recorded [7]

Site Primary lesions in women have been observed infrequently but when present are generally located in the region of the fourchette the cervix or the posterior fornix also on the inner surface of the labia minora The infection in the female probably enters through the vaginal vault or cervix This condition is common in females[18 130 1 4 1 189] due to lymphatic drainage of the vulva and the distal third of the vagina emptying directly into the perirectal and pelvic group of lymph nodes Inguinal adenopathy is quite uncommon in the female In the male the initial lesion appears on the penis, in the sulcus coro*narius of the glans*[87] *or on the prepuce* The drainage in the male is from the penis through the inguinal nodes, both deep and superficial It is relatively rare to see pelvic and perirectal adenopathy in the male[9 107] It is seldom noted by the patient, for the reasons given above, and rarely comes to the attention of the physician[9] Moreover, as *it heals without cicatricial formation, its* site is often undiscoverable even upon careful examination Hellerstrom[83] reports that in only five of a series of forty seven cases could he locate signs of an initial lesion whose etiology was definitely lymphogranuloma venereum Differential diagnosis is as necessary in studying primary lesions as in treating advanced cases, since these erosions might conceivably be confused with manifestations of ulcus molle[87] syphilis, gonorrhea and the various other venereal infections Dalton[40] writes that in his series it was noted in 45 8 per cent Cole notes 16 out of 37 cases[23 3] On the average from about ten to fifteen per cent of patients give a history of a primary sore[35 119 1 6]

Appearance It occurs as a pimplelike swelling varying in size from a pinhead to a pea[179] According to Beeson and Miller,[8] immunologic evidence of infection with the virus of lymphogranuloma venereum is frequently encountered in persons who show no sign of the clinical manifestations of the disease[7] There are four types of primary lesion papular[134] nodular ulcerative including herpetiform and erosive[87] and urethritic In our clinics we have observed only the papular and ulcerative The former was present as a single, smooth rounded elevation about the size of a match head quite painless reddish in color, and devoid of induration the latter was a single, small superficial ulcer with a red base Hellerstrom describes it as lenticular with clean cut edges and nonpurulent secretion The nodular form as described by Stannus[168] is hard and inelastic, with a small opening on the surface which exudes a small amount of whitish yellow sometimes sanguineous, discharge In the urethral variety the lesion



Fig 265 Inguinal adenitis in a case of lymphogranuloma venereum



Fig 266 Lymphogranuloma venereum presenting the usual inguinal adenopathy Scrotal elephantiasis shown

is noted as a painless infiltration a short distance from the orifice which bleeds readily It is given a distinctive title and classification not because of pathologic variations but simply according to the accident of location Many instances of these intraurethral lesions have been reported[1-3, 39, 5, 6, 81, 100, 1 3, 138, 160]

Adenitis or Suppurative Stage

After a secondary incubation period which has also been reported as of varying length but which in the majority of cases averages two weeks after the occurrence of the initial lesion, or four weeks after exposure, the second stage develops The onset is insidious for the reason that very little discomfort is present at the beginning In men, either the pubic glands or the medial group of the proximal subinguinal lymph glands, which lie close to Poupart s ligament, are first involved Gradually, however, the more lateral glands and in the late stage the deep subinguinal and the iliac glands are affected

At first the inguinal glands on one side begin to swell, manifesting a single inflammatory mass swollen and slightly tender[6] The skin is not adherent during the early stage, but as the periadenitis develops the skin becomes stretched glistening and bound down and the glands are closely matted together in large hard, indolent masses This mass usually breaks down and drains, a thin seropurulent fluid exuding for weeks or months through multiple fistulous tracts[1, 8] This process of development may require from two to six weeks but eventually the iliac glands become involved as a rule, and the skin changes from a bright erythema to the characteristic dusky, reddish purple or wine color[6, 1, 7] On palpation these lymph nodes are generally of firm or even hard consistency, although interspersed are felt multiple small areas of fluctuation[8] By some this is considered pathognomonic of lymphogranuloma venereum At times one is even able to feel the lymph strands leading as swollen bands from the superficial to the deeper iliac gland Eventually softening occurs and perforations of fistulae estimated by Hellerstrom as present in about fifty per cent of cases dot the area giving it a honeycombed appearance The whole may be described as an indolent spindle shaped puckered conglomeration of

inflammatory tissue The fistulous openings are often multiple and intercommunicate Allen and Mentzer,[1] in discussing manifestations of the disease, found among them single annular strictures, strictures associated with multiple fistulae multiple strictures cases with perianal skin tabs, and combinations of any and all of the above features More advanced rectal strictures especially the tubular variety[9] are characterized by extensive mucosal ulceration throughout the strictured areas but they are sharply demarcated from the grossly normal mucosa of the proximal bowel distal mucosa is friable, granular, edematous, hyperemic, and bleeds easily containing multiple small ulcers Rectoperineal fistulae have been found, with foul purulent fecal discharge Perianal or perirectal abscesses with fistula formation are frequent[130] These secondary lesions appear more often in the male than the female[1 4] It consists of an acute suppurative lymphadenitis with necrosis tender ulceration and multiple sinus formation This the typical bubo generally involves the inguinal regions and appears bilaterally in 20 per cent of the cases In 75 per cent the adenitis progresses to suppuration Frequent fistulous tract formation appears[87 1 8 189] They do not become larger but are irregular in shape, having wall like thick edges The discharge whether brought about by spontaneous rupture or by incision is moderate in amount and either serosanguineous or puruloid Subcutaneous sinuses or channels communicate and it is often possible by injecting fluid through one fistulous opening to irrigate numerous interlacing subdermal channels formed by the coalescence of the multiple abscesses At a later stage when the granulomatous element of the disease is fully developed the skin over these channels is thrown into folds or waves giving an irregular bumpy thickened feel and a washboardlike appearance Beneath the skin can be felt large masses or packages of glands bound closely together by adhesions The iliac glands rarely suppurate, but can be palpated as deep swollen tender masses



Fig 267 Inguinal adenopathy The skin retraction of the patient's left is typical

and it is often possible to feel enlarged lymph vessel strands intercommunicating between the superficial inguinal package of glands and the deep iliac group The extent of lymphadenitis within the abdomen in one series[6] varied from barely palpable nodes in the presacral area to the generalized enlargement of the rectocolic nodes of the sigmoid and descending colon As the subacute adenitis sets in, acute toxic skin eruptions may develop and may manifest themselves as fine macular or maculopapular eruptions or as typical erythema nodosum or multiforme[1 103 1 4 1 8]

After drainage begins the disease follows a chronic very torpid course The discharge may continue for months until little by little, the pus will disappear and healing will ensue by a fibrotic change with the development of deep contracted and depressed scars The retracting scars cause the inguinal region to become puckered In advanced stages the disease is unmistakable The sphincter is infiltrated with fibrous tissue and is usually relaxed so that the anus gapes when the buttocks are separated[1] A not dissimilar phenomenon occurs in the so called ataxic sphincter one of the findings in tabes dorsalis

The severity of the process is variable some patients having very acute manifestations with large glands which incapacitate them others having from beginning to end,

but a mild attack The disease has resulted in death[114] Six fatal cases have been reported by Pund and McInnes Chronic interstitial cystitis has been reported,[3c] the bladder wall being thickened, the epithelial layer thinned, in some places being destroyed and presenting subepithelial ulcerations, four such cases were reported by the authors They determined that the virus of lymphogranuloma venereum was the causative agent

The duration is also variable and may be from one to many months If the perirectal lymph glands become involved, the disease is prolonged and may develop serious sequelae At the other extreme, we have descriptions of a formes frustes which may endure but a few weeks In discussing these formes frustes Coutts and David[7] stated that many such forms, as well as simultaneous lymphogranuloma venereum lues, lymphogranuloma venereum gonorrhea and others with additional septicemic forms, have been described Frustes cases of this type, especially when unaccompanied by superficial adenopathies, are usually unrecognized, and therefore it is quite probable that there are more cases in which the disease had not been diagnosed, some recovering others dying

SYMPTOMS

Difficulty in walking, [1] which increases as the glands swell and the skin tightens fever malaise weakness backache anorexia pain and stiffness in the joints (arthritis arthralgia) [10] chills mild anemia and loss of weight are frequently cited Episcleritis has been reported by Cole[1c] who also cites urticaria and scarlatiniform eruptions as seen by Hellerstrom and others *The fever rises toward afternoon* but the pulse is slow in comparison Buerger's syndrome chronic interstitial cystitis,[3] gastrodynia, severe nocturnal meteorism,[35] diarrhea and constipation, [1] tenesmus,[130] abdominal distention [119] nausea and vomiting,[133] dyschezia [118] dizziness mild anuria and meningeal irritation, and splenomegaly[1 8] have also been mentioned by various writers In connection with symptoms of meningeal irritation, Rivers[1a] stated that it has been shown that the virus of lymphogranuloma venereum may attack the central nervous system, it has been obtained from the spinal fluid In proof of this contention, Ottolina,[1 3] working with spinal fluid obtained from free positive cases, stated that if the virus existed at all it would be much diluted He concentrated the spinal fluid *in vacuo* to avoid any change in its biologic properties The fluid obtained by reducing 10 cc to 1 5 cc, injected intradermally, resulted in the formation of a vesicle appearing 24 hours later at the site of injection, thus proving the statement advanced by Rivers As a rule the patient shows a mild leukocytosis, or possibly a leukopenia [13] However, the white count may be normal There is generally an increase in the large mononuclear cells this is considered of considerable diagnostic importance by some European writers Benitez and Lopez[9] reported an absolute lymphocytosis (from 36 to 56 per cent) Search of the literature failed to show similar reports

Eosinophilia has been reported as occurring frequently in this disease in some cases reaching as high as 23 per cent In another instance it was reported as 16 per cent Rodriguez[1a3] reported a case of the disease with a 3 per cent eosinophilia Actually occurrence is infrequent and when present may be very slight In all probability it is an expression of reaction of the organisms to anaphylactic or allergic processes

INCIDENCE

Age The age limits are noted as being from about fifteen to forty five, or the *period of greatest sexual activity*[101] In a series of 55 cases[6] the average age of the total group was 36 5 years, the eldest 68 the youngest 20 In another series[8] a sharp rise in incidence occurred after the age of 14, believed due to acquired venereal infection The incidence of positive reactions was approximately the same in all age groups beyond the fourth dec series

of 47 cases,[11] the youngest patient was 14 and the eldest 73 In a series of colored cases exclusively,[1] the range in age was from 11 to 56, nineteen being 20 or less and thirty four from 21 to 30 Isolated cases have been reported in children, but in no such case was sexual irregularity or abnor mality observed Paggi and Hull[1 9] quoted D Aunoy and Von Haam, who reported the disease in a male patient aged 94 The same authors quoted Arnell and Potekin s case of the disease existing in a newborn infant In our series of cases, *the greatest incidence oc* curred between 17 and 40 three cases under the age of one were noted the youngest of which was three weeks[3 5] A few mention cases of 50 years and over[113 169 191] In Yeomans series of 21 cases,[190] the age brackets ran between 23 and 57 years

TABLE 21 INCIDENCE ACCORDING TO AGE
(Author s Series)

	(1931 to 1937)		
Below 14	9	60 69	17
14 29	301	0 79	5
30 39	368	80 89	3
40-49	98		
50 59	51	Total	852

In our total series of 1124 cases the age incidence is

	(1931 to 1946)		
Below 14	17	60 69	18
14 9	361	0 /9	7
30 39	442	80 89	1
40 49	119		
50 59	59	Total	1124

Of the 17 cases below 14 three were 13 one was 12 two were 11 one was 9 one 8 two were 6 two 5 and one was 2 years of age One was 13 months old one 7 one 5 *and the youngest was 2 weeks of age*

Sex It was believed at first that the dis ease confined itself to or predominated in the male but observations plus the ob scurity of the primary lesion in the female as well as the suppression or deviation of pathologic manifestations argue that lym phogranuloma venereum is comparatively speaking equally distributed between the sexes To a great extent the ratio is de pendent upon the source of the series for instance in the genito urinary clinics the preponderance is in the male, because the *patients complain usually of swelling in* the groin

In a series of 55 cases reported from Bellevue Hospital in New York City,[6] there were 16 males and 35 females In a series reported from Mississippi,[115] there were 45 females and 2 males Females on the other hand usually present some rectal manifes tations such as stricture[1 6 9 29 30 44 0 11 130 133 1 4 180] Therefore, in the proctologic *clinics the* preponderance is more obvious in this sex In one of our series the figures were

(1931 to 1937)	
Females	567
Males	285
Total	852

In a series of 187 cases treated at Belle vue Hospital in New York City, the ano rectal type of involvement occurred one and one half times more frequently in women than in men and the number of patients with this type in 1938 was three times that recorded in *1935* On the other hand, in volvement of the inguinal lymphatic glands was twenty times more frequent in men than in women *and there were twice* as many patients hospitalized in 1938 as in 1935 In our series of 1124 cases there were

Females	778
Males	346
Total	1124

Greenblatt, in discussing sex incidence stated that the nature of the epidemiology should argue against a differential sex ratio and that the reported sex incidence favored the male However in the U S Public Health Clinics because of the chronicity and anatomic vagaries in the disease that are peculiar to the female, *greater incidence* in that sex has been observed

Heyman[87] believes that the sex distribu tion in lymphogranuloma venereum can ac count for the small number of patients with positive skin reactions

In Yeomans series of 21 cases,[190] 8 were male and 13 *female*

Race Early reports seem to confine this affection to tropical races, notably Negroes, but *with the awakening interest and observation in nordic countries*, some have come to believe that that race plays no significant part in the incidence [8] As shown by the accompanying table, the incidence in the colored race was much greater in the author's series and this seems to be the usual experience of investigators in this country [17a]

Colored	559
White	292
Chinese	1
Total	852

In the series of 1124 cases reported above the proportion was

(1931 to 1946)	
Colored	729
White	391
Mexican	3
Chinese	1
Total	1124

In the series of 55 cases reported by Barber and Murphy,[6] there were 43 Negroes and 18 whites In Beeson and Miller's series,[8] 116 Negro children as against 58 white children were reported In a series of *96 cases reported by Torpin Greenblatt et al [1] 92 were colored and 4 were white* In a group of 197 patients reported by Greenblatt, 13 were white, giving a racial incidence of 16 1 Yeomans reviewed 119 cases personally observed by him [190] Of these, 14 were of the white race and 7 of *the colored*

Occupation Early observations practically confined this disease to sailors and the lower classes inhabiting port cities, it was therefore believed to be carried from tropical regions on board vessels Since, however the study of this affection has been undertaken more or less universally, reports mention patients from nearly all walks of life Gray and Yieh [3] in a report from China, list students, housewives, hawkers, merchants actors soldiers, *sailors*, coolies, printers, blacksmiths, etc with the highest number equally divided between coolies and housewives In France, Flandin *and Turiaf,[41] in a series of four*, treated two clerks, a mechanic and a machinist Hellerstrom noticed a predominance in ports, Stannus believes that the apparent high frequency in sailors is not a true occupational incidence, while the lack of special comment on this phase by American observers would argue that the occupational incidence is so distributed as to justify no dogmatic conclusions as to any one class

TRANSMISSION

The mode of transmission is primarily and principally coitus Sodomy[9, 10, 100] and pederasty[101, 130] have also been reported as modes of transmission of the virus In this, experience justifies the inclusion of buccal coitus, and the practice of *suctio* penis and cunnilingus[11, 35, 38, 41, 90] A few scattered cases moreover, evidence the possibility of extragenital infection as well as extragenital lesions[11, 13, 15, 1, 38, 77, 9, 1] [14, 1] In the rare cases of the children mentioned above, it was found that the mother had been infected and had used her wash cloth, enema tip or other personal accoutrements on the child as well as having *the child sleep in the same bed with her* C R *Sonck reported cases of 5 girls* each contracting the disease from their respective infected mothers Stannus[168] mentions two sisters, aged six and seven respectively, who contracted the disease manifested by inguinal masses the size of hens' eggs in one *and ducks eggs in the other*, through the simple, ordinary contacts of living in the same house with an infected person In discussing transmission, Beeson and Miller[8] stated that comparisons were made in new born negro infants and their mothers, it was found that immediately following birth the reaction in the infants' serums was the same as that of the mother Nine infants who had given positive reactions (complement fixation) were re tested from 2 to 4 *months later, they all had become negative* A positive test at birth seems to be due to

the passive transfer of antibodies from the mother Physicians have become infected by surgical contact with these patients an instance has been cited in which the infection appeared first on the finger and later in the axillary glands not infrequently lesions occur on the neck [14, 16, 3, 28, 31, 49, 98, 1, 1, 16, 183] Cases of lymphogranuloma venereum involving the uterus have been reported [141] also the tubes and the ovaries [141] Extragenital involvement of the colon and rectum has occurred [3]

HISTORICAL BACKGROUND

With this clinical picture in mind let u go back in the literature to the earliest descriptions extant of inguinal buboes and note how faithfully these medical reports as we trace them through the ages reproduce essentially this ame clinical picture of lymphogranuloma venereum thus demonstrating the primitive existence of this disease, even though at that time unrecognized as an entity and unnamed officially

Celsus wrote One form of tumor, too is the struma in which there arise besides glands rather deep lying formations of coagulated pus and blood The e formations usually cause the physician extreme trouble as they produce fever and it is only with difficulty that they ever mature while in most cases whether they be treated with the knife or by medicine they appear afresh in the vicinity of the scar—this far more frequently after treatment by medicines In addition they are of long duration They are found especially on the neck, but are also seen in the armpits and the groin

Greek Roman and Arabian medical literature of ancient history deals fairly fully with the subject of buboes Among the Greeks and Romans they were called buboes and then further identified according to their kind or stage being divided into the classifications of strumous panus paniculus or inguen By the Arabs they were termed simply althaun, but although no definite classifications were made distinction was drawn between warm and cold hard and soft suppurating and indolent buboes All accounts mention the neck, shoulders and groins as the parts principally affected Moreover and of primary importance there was even mention here and there of the apparent connection between genital affections and inguinal buboes

Galenus definitely classified buboes applying the term strumous to those conditions in which the overlying skin has become erysipelatously inflamed and the glands have entered the ' hardened stage

The thirteenth and fourteenth centuries contribute the writings of Salicetti, of Bologna and Argelata, who were the first to point out clearly the indisputable causal connection between venereal lesions and inguinal buboes At this time the term bubo until now rather widely and loosely used, assumes restrictedly the meaning of a venereal affection in the inguinal glands and a further distinction as to types is attempted

In the fifteenth century syphilis was claiming the center of the medical stage and before the close of the century completed its evolution and emerged as a disease sui generis taking its place in the medical anthology with its own etiology symptomatology and pathology Perhaps therefore because this venereal disease was at the time uppermost in men s minds, and also because of the preponderance of genital influence in the etiology of buboes syphilis came to be cons dered the chief etiologic factor in the occurrence of buboes [196] During this century too a definite stand was taken as to treatment It was noted that the abscessing buboes, and only these showed no symptoms of the usual morbus gallicus For this reason, treatment always consisted of or included incision to induce the buboes even the indolent ones to suppurate

In 1786 John Hunter [89] in his Treatise on the Venereal Disease although this work was rather a hindrance than a help to the knowledge of syphilis contributed ma

ternally to the study of buboes in his chapter of the same name Herein he protested the acceptance of a general syphilitic etiology, pointing out most emphatically the distinction between venereal and nonvenereal buboes "Swellings of these glands," he writes, "are common to other diseases and should be carefully distinguished from those that arise from the venereal poisons

I think there is commonly one gland at a time that is affected by the absorption of venereal matter, which if so, becomes in some sort a distinguishing mark between venereal buboes and other diseases of these bodies The true venereal bubo in consequence of a chancre keeps nearly its distance, till suppuration has taken place, and then becomes more diffused The suppuration is commonly large for the size of the gland and but one abscess The pain is very acute The color of the skin where the inflammation attacks is of a florid red but I think that such buboes as arise without any visible cause are of two kinds, one similar to those arising from chancres or gonorrhea The second are generally preceded and attended with slight fever, or the common symptoms of a cold, and they are generally indolent and slow in their progress If they should be more quick than ordinary, they become more diffused than the venereal, and may not be confined to one gland When very slow they give but little sensation, but where more quick the sensation is more acute, though not so sharp as in those that are venereal, and most commonly they do not suppurate, but often become stationary When they do suppurate, it is slowly and often in more glands than one, the inflammation being more diffused, and commonly small in proportion to the swelling The matter comes slowly to the skin, not attended with much pain, and the color is different from that of the other, being more of the purple Sometimes the suppurations are very considerable but not painful there must be other causes *to account*" Here in the first part of this quotation, is a true description of ulcus molle, and the latter part is, it seems reasonable to conclude, a pathologic picture of lymphogranuloma venereum

Hunter believes the nonvenereal buboes to be scrofulous Ricord,[119] writing toward the middle of the nineteenth century, adds "tuberculous" to the qualifying "scrofulous and describes these lymphatic buboes as being very wide in scope, soft, edematous, elastic, and violet red in color He notes that the deep ganglia may also become involved, the course of the disease is extremely chronic, and the bubo gives no inoculable pus This type was even then known as simple chancre, as distinguished from the indurated chancre, the pus of which can be virulent, i e, able, by means of inoculation, to induce the characteristic pustule of the simple chancre After it has been opened according to Ricord, its external aspect alone is enough to distinguish it from a virulent bubo, for its edges are livid and not inflamed, and it remains a long time unaltered, the virulent bubo, on the other hand, phagedenates Ricord s contribution to the etiology is expressed in his belief that strumous buboes arise spontaneously in scrofulous or tuberculous dyscrasia of the blood, after genital lesions of various kinds

In the early part of the same century, William Wallace,[12-] writing of venereal diseases in general and particular, described buboes which appeared as multiple glandular swellings of violaceous coloring, accompanied by severe periadenitis and perforated by many fistulae These characteristics and the torpid course of the affection, extending over several months the thin, viscid pus, and the attendant fever would certainly seem to identify these lesions with lymphogranuloma venereum As to the etiologic cause Wallace makes no suggestion, but doubts his contemporary's conclusions as to scrofula

This story of the slow arrival at truth by the trial and error method which was the only method available in those prelaboratory days is fascinating in its many twistings and windings from theory to fact and back to theory and it is most edifying in the tale it tells of undaunted perseverance

and painstaking investigation along uncharted ways with practically nothing to work with but the intelligence and initiative of the observer These men were like explorers blazing a trail through a morass They were forced to jump from rock to rock, marking each step as they found it to be safe, these tried and proved points comprised what later became the highroad to technicalized medical science Sometimes they jumped to where they believed there might be a safe landing only to sink in the bog of confusion From this they were obliged to extricate themselves go back to their former point of security and cast about again for the next trustworthy step

The nineteenth century produced also Hugier[58] who stands prominent for his portrait of the rectal manifestations connected with these buboes, and whose observations will be considered in more detail in the next chapter together with those of his contemporary the Danish surgeon Larsen whose 'Practical Notes on Stricture of the Rectum" depict admirably the essentials of this condition

Chassaignac and Velpeau[18] although writing at different times give an almost identical description of l adenite suppurative interganglionnaire' lymphatic masses in the groin which followed what is now recognized as the usual course of lymphogranuloma venereum The terminology employed by Chassaignac[9] is probably the *initial incidence of the classification of* adenitis as such

Greece ancient Rome medieval Italy England Denmark and France have thus far woven the thread that spells out letter by painstaking letter the slow evolution of the history of this disease In 1867 Scheube[16] a German physician living in Japan records what by that time had come to be the conventional description of these inguinal buboes Like his predecessors, he gives *the condition the name he* considers best suited to it calling it because he found it prevalent in regions and seasons of high temperatures, "climatic bubo This term became the most widely and persistently used of all the designations applied to this disease

Another "first report' came from Jouet in Indo China, in 1882, and from Pardo Castello,[131] writing in Spain, in 1896 In the meantime (1875) Fournier, then believing himself to be dealing with tertiary syphilis wrote extensively and emphatically of a fibrous process of the rectal wall, which became widely known as the anorectal syphiloma of Fournier, now identified as lymphogranulomatous stricture of the rectum In 1890, H G Klotz,[99] a physician working in a New York hospital reported that in ten years he had seen 120 cases of 'strumous bubo' most of them coming in the summer He felt that they had no relation to syphilis, though he had often noted the concomitant appearance of an erosion or small sore, or of herpetiform lesions of the genitalia He found that the lymph nodes in the groin were filled with miliary pus foci

With this report the globe has been circled roughly and this as yet unnamed disease has been traced around its orbit This in itself contradicts the term at that time most commonly applied namely, climatic bubo' Thus on the threshold of the twentieth century, this fascinating history stands at an end and a beginning the end of the first era of blind groping along an unknown way with feeble attempts to mark the path as each uncertain step was taken the beginning of a much better defined and *more enlightened search for identification*, classification and medication or immunization

In 1890, Nelaton[1] threw out the first guide to the new direction with the publication of his valuable observations—valuable because in them he was the first to declare these lymphatic *buboes to be an in*fectious disease "sui generis' In the following two decades many reports were made which while they added to the general knowledge of these buboes completely ignored this claim of Nelaton s Among these writers were Lejars,[104] with his strumous bubo of the groin' Pardo Castello, who adhered to the name and

terially to the study of buboes in his chapter of the same name. Herein he protested the acceptance of a general syphilitic etiology, pointing out most emphatically the distinction between venereal and nonvenereal buboes. "Swellings of these glands," he writes, "are common to other diseases and should be carefully distinguished from those that arise from the venereal poisons.

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FIG 269 Esthiomene of vulva and anus



FIG 270 Extensive esthiomene of vulva and anus

whether seemingly related or not, and to the condition of various organs and to any unusual manifestations Pardo Castello[131] at that time in Havana described a ca e involving an enlarged spleen This observa tion was duplicated by Naumann[1 1] in 1931 In 1927 Frei and Hoffman[61] noted erythema multiforme and Koppel[100] men tioned rheumatic manifestations Both of these observations were confirmed later the former in 1931 by Nicolas Favre and Lebeuf[1 4] and in 1932 by Liebreich and Gottlieb[107] and the latter in 1932 by Gott lieb[1] who indirectly demonstrated blood carried antibodies In 1930 Jadassohn[97] re ported an erythema nodosum formed by multiple focal cutaneous Frei reactions which gathered on a previously sensitized skin In 1931 Gans[64] reported erythema nodosum in ten per cent of his cases

One of the great names in this history came to prominence a few years earlier when in 1929 Sven Hellerstrom[91] pub lished in Switzerland his Contribution to the Knowledge of Lymphogranuloma In guinale the most comprehensive detailed and authoritative exposition of this malady which has been written even to this date In it no startling discoveries or new theories were announced but as a history of lympho granuloma venereum from its earliest prob able mention among the ancients down to that author s own day, this work is in valuable and unequaled

In the United States the accumulation of the literature rapidly gathered momentum as interest quickened and spread Cole De Wolfe, Van Cleve Sulzberger Wise and Coutts were among those who wrote almost exclusively for a time of this disea e To Wolf and Sulzberger[18] we are indebted for the most typical and comprehensive title thus far suggested, namely lymphopathia venereum The same year Sulzberger and Wise[1 0] pre ented an article under the same title stating their preference for it to be due to the fact that it embraces all the patho logic characteristics of the disease but does not lead to confusion with other maladies The name lymphogranuloma inguinale on the other hand is suggestive of and may be confused with granuloma inguinale a purely cutaneous affection For the purpose of clarity and the avoidance of irrelevancy in technical nomenclature the author hence forth will refer to the entity throughout this



FIG 268 Esthiomene of vulva and anus Drawing of a proved case of lymphopathia venereum Frei test positive tissue section positive

theory of climatic bubo and Marion and Gandy[110] who reverted to the tuberculous etiologic theory of "adenite subaigue"

Among the pioneers of the new research however were Tanton and Pigeon[173] who observed 147 cases in Algeria and proved conclusively the nontuberculous nature of the disease Then appeared, in 1913, the extensive and intensive observations of the two French physicians who worked exclusively and progressed so notably with this disease that it came to bear and still does bear in their native land, their joint names, Nicolas and Favre,[49] being known as Nicolas Favre's disease These two, working separately, together or in co operation with Durand, established beyond question several factors, among them being (1) that this was a distinct, specific, and, as such new disease (2) that it was epidemic in its nature (3) that its etiology was not tuberculous but venereal, (4) that its mode of transmission was coitus Further, they applied the first pathologically accurate term "subacute lymphogranulomatosis inguinalis," from which the present accepted title of the disease was finally evolved The same year Heiner[50] published a report of eighteen cases in all of which sexual exposure had occurred and in the United States naval medical officers awakened interest with their reports of these buboes occurring among their charges[136 1 6 153]

World War I dropped a curtain temporarily over this march of progress, but in 1920 the scientific advance resumed its quickened course with Jersild,[93, 94] Jadassohn[67] further reports from Nicolas, Favre and Durand, as well as from their pupil Phylactos[138] By 1922, Russia Poland Rumania, Spain, Portugal, Norway and Finland had joined the cavalcade, followed a year or so later by Gamma[63] in Italy, Destefano and Vaccarezza[46] in South America, who referred to "poradenitis," McDonagh in England, Harrison in America with *the climax, in 1925, of the record* making work of Frei in Germany From this time on, the history of lymphogranuloma venereum is so intimately bound up with the Frei test that a detailed description of this test its source, method of application and effects is given immediately after the close of this historic summary The technic of the Frei test was disseminated rapidly and reports of individual experiences with its use multiplied

In 1925, also Ito Reenstierna[91] developed a specific skin reaction for ulcus molle which is useful as an eliminative means of diagnosis for lymphogranuloma venereum

The affection was by now universally identifiable and those studying it, who had until this time been concerned chiefly with its inherent characteristics, began to pay more attention to concurrent abnormalities

In discussing pathology, Coutts[20] demonstrated the presence of the virus in 2 cases of penoscrotal elephantiasis In unusual cases arthritis develops,[6] a common symptom during the course of the disease being arthralgia Urethral stricture apparently attacks male and female alike[71] These symptoms are frequently found without other manifestations of lymphogranuloma venereum and often in the absence of a history of a primary lesion or bubo

HISTOPATHOLOGY

Macroscopic section reveals that the glandular tissue has metamorphosed into a grayish red mass perforated with fistulous channels and abscesses varying in size from the infinitesimal to a tennis ball[90] This perforation gives the infected area a spongy appearance and substance



Fig 272 Esthiomene of sacrococcygeal region

The histologic picture consists of an abscess formation composed of polymorphonuclear leukocytes and small round cells surrounded by a palisade arrangement of epithelioid cells plasma cells[148, 159] and a scattering of giant cells There is complete mucosal loss with a superficial slough composed of disintegrating tissue cells and pus, and beneath this a basic framework of new fibroblasts and new blood vessels, with a heavy infiltration of lymphocytes and plasma cells[6] The capsule is markedly thickened and is perivascular When the



Fig 273 Lymphogranuloma venereum Extensive involvement of the anogluteal and sacrococcygeal regions with multiple sinuses Frei test positive tissue section pathognomonic of lymphogranuloma venereum



Fig 271 Vulvar elephantiasis with granulomatous areas about the vulva and the anus

edition as Lymphogranuloma Venereum '

In line with the ever widening scope of study, owing to increased knowledge of and familiarity with this disease the late years have produced observations dealing with variations of the lymphogranulomatous infection such as the genito anorectal syndrome,[1] extragenital infections, elephantiasis partner cases, differential diagnosis[14, 145, 177] and variations of the use of Frei antigen[4, 60, 169, 173, 180] These last deal mainly with the treatment of injections of Frei antigen and will be mentioned more specifically under treatment The anorectal component is an inevitable sequel in both sexes when the perirectal glands are involved, either by direct or retrograde extension of the infection

Occurrence in the female is far more common,[75] due to lymphatic drainage from the vagina resulting in lymphatic spread of the virus toward the perirectal glands In the anal syndrome, polypoidal and lobulated growths appear about the anal orifice occurring either singly or concurrently with a genital or rectal syndrome In the early stages, indurated, rubbery anal tabs often mistaken for hemorrhoidal tags are present In the rectal syndrome, stricture is frequently found without other manifestations of lymphogranuloma venereum and often in the absence of a history of a primary lesion or bubo Conversely, a history of bubo may be obtained sometime prior to the development of rectal symptoms The stricture is usually of the cylindric, "rubber hose variety, situated several centimeters cephalad to the anal orifice It averages 4 cm in length although annular constrictions as well as strictures approximately 10 cm in length, have been encountered The lumen may be so stenosed as to admit the examining finger with difficulty On palpation, the walls of the lumen present an indurated and at times, a semirigid surface

This is by no means a completely detailed history of the identification of lymphogranuloma venereum, but its scope is comprehensive and it embraces the descriptive highlights which serve to identify the disease along the course of the years and to trace satisfactorily the gradual growth of our knowledge thereof

PATHOLOGY

The gross pathologic appearance and changes, although not considered pathognomonic, are definitely characteristic, permitting differentiation from other specific glandular and cutaneous infections In the stage of adenitis, the mass is of the characteristic violaceous color and is honeycombed with fistulous openings[1, 6, 9, 18, 23, 9, 13, 148, 171, 8, 167] The skin is tightly bound down and is further constricted by numerous fibrous adhesions intertwining over the whole Owing to the difference in male and female lymph drainage, the secondary manifestation or inguinal adenitis, is infrequent in women[9] Their chief manifestations are more apt to be inflammatory stricture of the rectum and anorectal abscesses and fistulae[9] less commonly, anovulvar esthiomene and elephantiasis[35, 189] In the male, however, elephantiasis penis et scroti is usual, the anorectal syndrome almost rare

fied, the virus is capable of passing a Berkefeld V and a Chamberland L 3 candle[1,3] It will not pass an ultrafilter[10] It has been found to survive at 2° or 3° C below zero for ten days at 4° for 23 days, at from 10° to 20° for 30 days, Rodaniche[1,1] gives her figure as 4 months at room temperature for from 24 to 48 hours at 46 up to 30 minutes at 56 for 10 minutes it is destroyed at 60° C It loses its virulence in 0 1 per cent formol in glycerin and upon prolonged desiccation Miyagawa and his associates[117] found it still active after 30 days but inactive after 35 days desiccation Tamura[1,1] reports cultures made on Tyrode s medium, one being carried through 24 subcultures

Animal Experimentation

Lymphogranuloma venereum is freely and reciprocally inoculable among men and animals Paulsen[13] confirmed the presence of the virus in stools of patients obtaining a potent antigen from the feces The best experimental animals are mice (preferably white) guinea pigs and monkeys, preferably the *hapale penicillata* or marmoset Phylactos[137] has successfully inoculated rabbits in the cornea and believes that these animals promise to be equal to or perhaps greater in value for experimental and diagnostic purposes than monkeys which are costly and hard to obtain Some strains become more virulent at each passage Chatellier[1] has accomplished at least twelve passages of one virus The Kamm strain the most virulent has been passed through twenty monkeys without attenuation A labile toxic agent in suspensions of l venereum virus has been reported regarded as analogous to bacterial endotoxins The toxic agent was associated with the elementary bodies Antisera neutralizing a few m l d s of the toxic agent were obtained Immune human sera also neutralized the toxin but very specifically showing no cross reactions with the antigenetically related viruses[0] Conversely the intradermal injection of a single strain into one patient becomes less potent at each injection Microscopic study of inoculable material yields no distinctive characteristics Rodhl e bacteria not unlike the Donovan bodies of granuloma inguinale, have been observed[31 4 114 1 1 1 5 17]

Antigen prepared from animals is equally as valuable as human antigen Lichtenstein and Von Haam[181] state that ' brain emulsions of white mice and of monkeys (*Hapale penicillata*) infected with the virus of lymphogranuloma venereum provide a large supply of a uniformly potent antigen for the diagnostic intracutaneous test[1] There is no danger of contamination with pathogenic organisms particularly of the spore bearing type as there may be when pus from spontaneous buboes in humans is employed directly for the preparation of the antigen Finally the false positive reactions obtained occasionally with the Frei test are completely eliminated by this method' Knott[60] has stated that biologic false positive tests for lues with concurrent chancroid lymphogranuloma venereum and other types of nonluetic genital lesions occur with surprising frequency Nonfiltrated antigen is the more virulent It is stated as a general fact that after two months the antigen is not reliable for diagnostic purposes although scattered instances of reactions obtained with antigen older than this are recorded Hellerstrom having used successfully an antigen over a year old[82] It has been our experience that the Frei antigen is most active until about the third month and then diminishes in its potency until the ninth month after which it is usually inactive

DIAGNOSIS

Laboratory Diagnosis

Chick Embryo Antigen Morris and Canizares[113] studied the thermal response in 24 cases of l venereum and in 24 control cases after the intravenous injection of 0 1 cc of chick embryo antigen Thermometric readings were taken every 2 hours for 48 hours after the injections were given Each patient also received 0 1 cc of chick embryo antigen control 0 1 cc mouse brain antigen

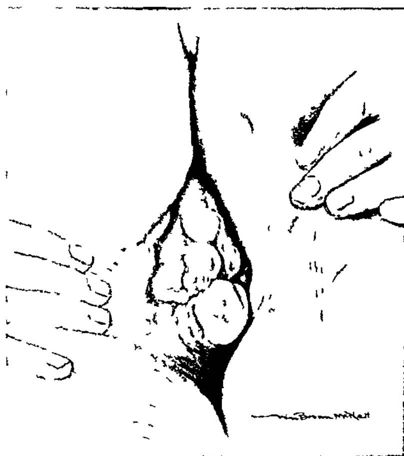


Fig 274 Lymphogranuloma venereum proved by the intracutaneous test of Frei and tissue section showing gross destruction of the anorectum by the devastating process Patient was subsequently colostomized



Fig 275 Esthiomene of anoperineal region

areas of suppuration are not separated by the granular tissue sufficiently to protrude the honeycombed appearance, they run together and form stellate abscesses

ETIOLOGY

The existence of two types of virus or of a double acting nature in the single virus of lymphopathia venereum is a general theory among those who are making a close study of this disease[30, 34] Nohara[16] quoted Schoen who has already asserted that the virus has different forms in acute and chronic (latent) phases Levaditi confirmed this postulation He ultrafiltered 10 per cent brain emulsion following centrifugation He placed the size of the virus in the acute stage as approximately 500 millimicrons and that of the chronic phase approximately 690 millimicrons Although t yet identi

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and 0.1 cc. of mouse brain control intravenously. Sixteen patients received in addition 0.1 cc. of a potent human antigen.

Each injection was given no sooner than 48 hours after the preceding one, and if a thermal response was obtained from any injection, the subsequent one was not given until the temperature had returned to normal, remaining at that level for 48 hours. A positive reaction was considered to be one in which the temperature reached 101° F. or higher, for 12 hours or more. Morris and Canizares showed that the cutaneous reaction obtained from the intradermal injection of 0.1 cc. of chick embryo antigen compared favorably with that obtained when a similar amount of mouse brain or human antigen was injected intradermally. They found, however, that chick embryo antigen was not reliable when used intravenously as a testing agent for l. venereum. Conversely, the mouse brain antigen proved thoroughly reliable in this connection. The mechanism involved in the production of cutaneous reactions to the Frei antigens is quite independent of the mechanism which produced the thermal response to those antigens.

Reider and Canizares, quoted by Costello and Cohen,[7] recently summarized the results of intradermal tests performed at Bellevue Hospital in 116 ward patients having l. venereum, using 204 other subjects as controls. The former yielded 90 per cent positive, 9 per cent negative and 1 per cent doubtful reactions to mouse brain antigen, the negative reactions occurring in the early stage of the disease, becoming positive later. Those in the control group gave 93 per cent negative, 5 per cent positive and 2 per cent doubtful reactions to the antigen. Results with mouse brain and human antigen were approximately the same, postulating their equal value in making the diagnoses of l. venereum. The intravenous use of mouse brain antigen as a check on doubtful intradermal reactions was employed by Decker, Canizares and Reider. An elevation of the temperature to 101° F. or higher for a minimum of 12 hours following the injection was considered a positive reaction. Eighty five per cent of those showing positive intradermal reactions also gave positive intravenous reactions, the remainder gave doubtful reactions. Of the controls, 92 per cent did not react, 8 per cent yielding doubtful results.

Combes, Canizares and Morris[4] studied 356 patients over a period of 9 months. In all cases, antigen was composed of inoculated yolk sac of a developing chick embryo, this agent being compared with mouse brain antigen. Potent human antigen was used on 102 cases, and controls were made with normal mouse brain and normal yolk sac. One tenth cc. of each reagent was injected intracutaneously on the flexor aspect of the forearm at 3 cm. intervals and readings made 48 and 96 hours later. Positive reaction was determined in the event of the formation of a 7 mm. papule appearing 48 hours following injection. The control reaction was invariably imperceptible at this time. Positive mouse antigen reactions occurred in the presence of papules larger than 7 mm., visible on the fourth day, with a corresponding lesser reaction to the control media. Chick embryo antigen, obviously, is to be expected to give positive reactions in allergic subjects, sensitive to eggs, but this nonspecific protein reaction has been negligible in their series.

False positive reactions consisting of those of a positive reaction in a patient free of l. venereum, have occurred. Reider and Canizares showed that mouse brain gave 5 per cent false positive reactions, with 2 per cent doubtful in the controls. False positives have occurred in children on whom the human antigen test was done. Cross reactions using the same antigen have occurred in cases having other pathology, especially in the colored race. Kornblith obtained an unusually steep percentage using chick embryo antigen with human antigen as a control. On rare occasions in normal subjects, controls exhibited more pronounced response than the antigen, the answer to which still remains purely presumptive. In one case, each and every one

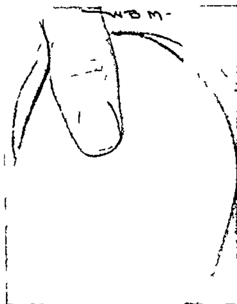




FIG 276 (*Left*) Illustration of a positive Frei reaction seventy two hours following the test

FIG 277 (*Above*) Outer margin circled with gentian violet

of the reactions gave negative results The case was one of esthiomene with a high temperature curve following intravenous use of the antigen, with a blood protein ratio consistent with the presence of this syndrome Ultimate results proved chick embryo antigen reliable and simpler of evaluation having less tendency to develop false positive reactions or those of a negative type than that of mouse antigen

On the other hand, Rodaniche Kirsner and Palmer in 1943[1] thoroughly examined four cases of enteritis for evidences of l venereum They used mouse brain and human antigen as testing media They found no neutralizing antibodies in the serum and although they had previously succeeded in isolating the virus from biopsies taken at proctoscopy attempts to do so using large ileal segments and neighboring mesenteric lymph vessels obtained negative results In addition results of animal inoculation were negative negativing the presumptive culpability of l venereum as a causative factor incident to cases of regional enteritis

An editorial in the Annals of Internal Medicine 1945[141] gave brief mention to the Inverted Frei Test On the basis of this, a positive intracutaneous test with antigen prepared from suspected lesions of l venereum in Frei positive patients showed other lesions as having been attributed to this virus However, the test has not been accepted

Rake and his associates, quoted by Mann,[109] working at the Squibb Institute for Medical Research, observed similarities and differences among members of the lymphogranuloma psittacosis group of infective agents, including those of l venereum Microscopic examination of various tissues infected with agents of this group revealed striking morphologic similarities as shown by the presence of elementary bodies measuring from 125 to 250 mm in diameter When the yolk sac antigen of l venereum was used in complement fixation blood testing further similarities and differences were demonstrable The intradermal test, using this antigen, has been known to cause cross reaction with cases of human atypical pneumonia but does *not* always occur probably due to many different types being associated with the entity Mann also quotes Rake McKee and Shaffer who used the Cox technic They cultivated the agent in the yolk sac of the embryonated chicken s egg, having obtained concentrated suspensions of elementary bodies and, in this manner a highly purified specific antigen known as Lygranum, S T ' was prepared, this rapidly supplanting antigens prepared from either human pus or

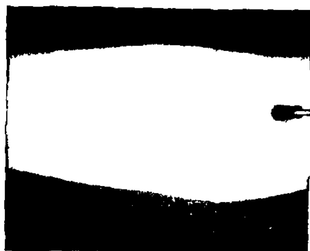


Fig 278 Positive Frei reaction

infected mouse brain This antigen is credited with the additional means of detecting incipient cases of the disease Kornblith administered 3,500 injections to 207 patients, obtaining striking results in the glandular (bubo) type, symptomatic relief being brought about in cases with rectal lesions

In an epidemiologic study of the disease, employing the complement fixation test, Beeson and Miller[3] tested 879 patients at Grady Hospital, Atlanta Ga Approximately 40 per cent of adult Negroes and 12 per cent adult whites gave positive reactions There were only 6 positive reactions among 116 Negro children under 14 years of age, and but one positive reaction among 58 white children in the corresponding age group However, a sharp rise in incidence occurred after the age of 14, believed to be due to acquired venereal infection The incidence of positive reactions was approximately the same in all age groups beyond the fourth decade The persistence of an immune reaction in age groups with less sexual contacts, suggested that the virus persists in the body, providing thereby a continuous antigenic stimulus Comparisons were made in newborn Negro infants and their mothers it was found that immediately following birth, the reaction in the infant s serum was the same as that of the mother Nine infants who had given positive reactions were retested from two to four months later, they had all become negative A positive test at birth seemed due to the passive transfer of antibodies from the mother The error introduced by the fact that infection with other members of the lymphogranuloma psittacosis group of viruses will give rise to a positive complement fixation test for l venereum could not be assessed in a positive degree It was unlikely that the prevalence of infection by other agents in this group was sufficient to distort greatly the picture of the prevalence of l venereum

The Vesicular Test To overcome many of the drawbacks incident to the Frei test, antigenic animal sources were suggested by Ottolina[179] Created by artificial infection of laboratory animals such sources are now available, using the ape and white mouse Incidental peculiarities relevant to the classic Frei test often lead to perplexities that is small indurations without redness not exhibiting the admitted dimension or a small, lightly colored induration The erythematous component of the reaction still remains an unexplained theory to be proved and a problem to be solved

The question resolved itself into whether this phase was the result of infectious origin or an inflammatory reaction due to pus albumens As the erythema showed a concentric inflammation at the injection site, just how much of the specific test aspect was influenced by this secondary inflammatory component remains a moot point Similar phases suggested the finding of a newer diagnostic method for this poradenic infection Verne s test, the complement fixation test and the formol gel reaction were advanced

Owing to the observation that the cerebromedullary axis was invariably involved in experimental infection, Ottolina postulated that if any antigen at all existed in the spinal fluid it would be greatly diluted He concentrated the fluid in vacuo to avoid any change in its biologic properties Both spinal puncture and vacuum concentration were done under strict asepsis The degree of concentration was read fro ime to time

in a graduated pipet, closed at one end, the other submerged in the fluid contained in a porcelain capsule Ten cc were concentrated to 1 5 cc, the resultant fluid resembling a colloid solution, opalescent and foaming on agitation

On intradermal injection, a vesicle appears within 24 hours at the site of injection, the phenomenon being called the vesicular test Frei negative cerebrospinal fluid was used as a control which injected intradermally in the positive cases, failed to cause the reaction

An important fact is stressed by Ottolina The blister test has been provoked by him in the same patient who furnished the spinal fluid An autogenous reaction is, therefore quite possible, emphasizing the diagnostic value of this point The study of this test on various groups of patients showed it to be positive in those having poradenic viral infections and it must be inferred the test is therefore specific To ascertain specificity, the concentration of the spinal fluid employed was a reduction of 10 cc to 2 cc and the amount injected intradermally was 0 3 cc

The Frei Test Frei's test links, nowadays many divergent pathologic processes Ottolina has advanced a theory that infection by the poradenic virus of l venereum should be considered a general disease with three periods, like lues but with anatomic changes more or less limited to rectogenital areas although extragenital localizations have been noted

While the Frei test for diagnostic value is unquestionably recognized, its specificity, though practically 100 per cent is still subject to doubt in some cases The author[2] in a previous article tabulated the percentages of positive reactions as observed by various investigators The majority registered 100 per cent most of the remainder giving readings above 90 per cent

Conversely at the opposite extreme, a very recent article by Charles Flandin and Jude Turiaf of the Hopital Saint Louis France stated The opinion which we have reached is in accord with the conclusions announced by Ravaut in the thesis of his pupil, Maisler" The action of the l antigen is very inconstant

However, it *should be remembered that* a negative result does not necessarily predicate freedom from contamination The reaction may reveal negative results in the initial phases of the disease appearing subsequently when the infection has progressed from the lymph glands to the skin In concomitant tuberculosis and lues venerea the Frei test may be suppressed, either partially or totally [111]

The Neutralization Test Rodaniche[1 1] stated that this test has proved a highly important aid in the recognition and epidemiologic study of numerous viral diseases

Forty five serums in all were investigated by her for their virus neutralizing properties nine from patients with positive Frei reactions and 36 with negative reactions Positive serums tested even after three months storage at 4 degrees centigrade, in the refrigerator, were found to have retained their full neutralizing potency Mouse brain virus was used All positive sera showed neutralizing antibodies except one, that drawn from a patient with a unilateral adenitis of three weeks duration None of the sera from patients presenting negative Frei tests gave evidence of neutralizing capacity Most of those positive were tested two or more times as positive controls for other series of test sera, giving consistently positive results Negative results in the demonstration of neutralizing antibodies in the sera of patients with l venereum as reported in the literature may, in some instances, be referable to technic

By means of the intracerebral neutralization test in the white mouse Rodaniche was able to demonstrate neutralizing antibodies in the sera in 8 of 9 patients with positive Frei reactions but she failed to demonstrate their presence in the sera of the 36 with negative Frei reactions

Nohara[107] stated that the virus from monkeys is much smaller than that from



FIG 279 Yaws of anus S F, age 8, female Kahn 4 plus (Comdr J C Traugh, M C U S N, Guam Mem Hosp)

mice The size of the l inguinale virus appeared, therefore, to be dependent on the phase and host of the disease and also on the concentration of the filtrate Menk and Mohr *quoted by Nohara, drew from their* studies which confirmed the existence of Miyagawa bodies and the occurrence of divergent types of l venereum virus The variant properties and occasional irregularity *of the Frei reaction is thus explained*

Clinical Diagnosis

The diagnosis is plain in the presence of an inflammatory swelling of the inguinal lymph nodes, running a chronic course through the stage of multiple draining fistulae together with the characteristics previously enumerated Any or all of the chronic symptoms, such as fever, malaise headache, stiffness of the joints vomiting, weakness etc, may be present Anal esthiomene and rectal stricture are *not difficult* of diagnosis A positive Lygranum reaction is practically specific, but in all cases it should be supported by *microscopy of the* tissue from the lesion It should be remembered, too that a negative reaction may indicate merely a quiescent or semicutaneous state of development It must be *stated also that in accompanying syphilis* or tuberculosis there may be suppression of the Frei reaction [23, 25, 43, 48, 73, 111, 150, 159]

Differential Diagnosis

In typical cases the clinical picture can scarcely be confused with any other, but the chief affections from which lymphogranuloma venereum must be distinguished are tuberculosis, syphilis,[100] gonorrheal and *pyogenic bubo, Hodgkin s disease,*[163] chancroid[8] ulcus molle, granuloma inguinale, [1 n 1 1 10] malignant growths,[1 41 179] and in some climates pestis minor and bubonic plague

TREATMENT

Because of the obscurity of the etiology, there is as yet no specific treatment, but worth while results have been obtained with *a variety of methods and* combinations of methods These may be divided according to their nature into four groups 1 Chemotherapeutic, 2 Biologic, 3 Physical, 4 Surgical

Chemotherapeutic

This method consists of the injection or local application of various drugs or minerals De Wolfe and Van Cleve[48] favor the use of antimony salts[77 154 167] They have been used intravenously,[7 1 4] with the authors also using compresses and irrigations of antimony and tartar emetic locally Also in use are salts of iron, salts of potassium[170] gold salts, arsenic, neoarsphenamine, fuadin[77 35 158] salts of mercury iodoform emulsion or some similar emulsion such as that made with linseed oil[9 4 161] iodine thymol iodide, quinine, thiocyanate[70] strychnine pyrogallol, lugol,[69] tartar stibiate[167] stibenyl[4] *neo stibosan cuprasol, emetine cuprasol*

TABLE 22 DIFFERENTIAL DIAGNOSIS—INITIAL LESION IN THE MALE

DESCRIPTION	LYMPHOGRANULOMA VENEREUM	SYPHILIS (CHANCRE)	CHANCROID (ULCUS MOLLE)	GONORRHEA
Etiology	Filtrable virus	*Treponema pallidum*	Streptobacillus of Ducrey	Gonococcus of Neisser
Characteristics				
Incubation period	5 15 days after exposure	2 6 weeks after exposure	2 4 days after exposure	3 5 days after exposure
Presence	Not always	Always	Always	—
Form	1 Papular smooth rounded size of match head 2 Nodular hard inelastic 3 Ulcerative lenticular red base sharp clean cut edges secretion nonpurulent 4 Intra urethral noted as pain less infiltration bleeds readily All types evanescent—no induration	Erosion or umbilicated papule round oval or irregular Dull red later copper color floor slightly excavated dense indurated after 14th day smooth somewhat crusted	Vesicopustule gradually becomes superficial ulcer about size of dime no induration soft edges slightly elevated jagged floor lard coated grayish yellow	Intra urethral
Auto inoculation	None	None	Present	
Number	Single	Single	Multiple	
Discharge	Serous in character slight in amount clear not purulent	Slight oozing mucopurulent	Profuse purulent	Profuse pus thick and creamy accompanied by edema of glands and meatus
Pain	Painless—no pain on urination	Painless	Painful	Painful urination
Inguinal adenopathy	Unilateral or bilateral	Bilateral	Unilateral	Unilateral or bilateral
Laboratory		*Spirochaeta pallidum* under dark field illuminator	Streptobacillus Ducrey in smears	
	Antigen test positive	Later Wassermann Kolmer Kahn positive	Ito Reenstierna test positive	Gonococcus in smears by Gram stain
Treatment				
Responds to	Specific antigen intradermally subcutaneously and intravenously injected	Antiluetic therapy	Local treatment and intracutaneous or intravenous injections of Dmelcos streptobacillus vaccine	Penicillin therapy

TABLE 23 DIFFERENTIAL DIAGNOSIS

DESCRIPTION	ESTHIOMENE (ANOVULVAR) (ELEPHANTIASIS)	EPITHELIOMA	GRANULOMA INGUINALE	CONDYLOMA LATUM	CONDYLOMA ACUMINATUM	VERRUCOUS TUBERCULOSIS
Characteristics	Most common in colored females between 20 and 40 Anovulvar region usually involved enormous edema and hypertrophy of tissue which is thick and inelastic	Usually after 40 Nodular excess granulation broad base indurated Metastatic	14 40 Affects groin scrotum vulva perineum or anus Fungating granulomatous masses red in color and soft consistency Certain areas often devoid of pigment	Flat warts elevation edges sharply defined rise at right angles to skin Tends to form large fungating masses Covered with macerated epithelium	Single or multiple vegetations about the anal margin glistening and pale pink in color, elevated edges	Warty or papillary excrescence scalloped in outline definitely circumscribed brownish red mammillated and rough
Ulceration	Frequent Ulcers are numerous and extend linearly edges firm undermined and ragged base irregular	Granular appearance with raised irregular edge reddish violet in color with gray base Tendency to bleed scab formation	Ulcers—edges everted and rolled floor dirty and fungating bleeds readily Heals with retracted and elevated scars Auto inoculable	Frequent single or in groups	Occasional and in groups	Occasional at first single gradually increases in size and number
Discharge	Grayish yellow in color and purulent	Slight in amount and watery	Thin slight in amount mucopurulent	Slight—offensive	Slight in amount	Moderate thick and foul smelling
Laboratory	Antigen test positive	Biopsy positive	Gram negative bacillus belonging to aerogenous group Donovan bodies	Wassermann Kahn Kelmer test positive		Tubercle bacilli in scrapings tissue section shows typical histologic tubercles of tuberculosis Tuberculin test positive

stilbenyl, tartar emetic, four per cent copper ammonio sulfate [13] glycerin,[139, 140] lead lotion ichthyol ointment cholesterolized bismuth [77] neoprontosil [1 7] mineral oil orally with phenacetin for dorsalgia [18] sulfanilylguanidine, in the absence of stricture [130] vitamins with yeast [18] sulfanilic acid orally [58] sulfanilamide either alone or with adjunctive therapy [18 27 29 108 109 11 130 1 8 17 188 189] sodium sulfanilyl sulfanilate [18 109 11 1 7 1 8 107 1 188] and sulfanilamide in conjunction with Frei antigen intravenously[77] or with Frei antigen intradermally [128] Massive intravenous therapy has been used successfully [79] particularly sulfathiazole [109] The Cook County Hospital employs compresses saturated in aluminum subacetate solution for excessive swelling Sezary and Facquet[160] have used fairly satisfactorily a new antimony salt called III sodium thiomalate of antimony "[167] The very multiplicity of remedies indicates the experimental nature of the treatment Results have been good in some cases disappointing in others In our cases we have employed fuadin tartar emetic dilute hydrochloric acid and chaulmoogra oil with no noticeable improvement

Biologic

The original form of biologic therapy consisted in the injection of serum prepared from portions of the affected glands To this there were two great drawbacks first much difficulty was encountered in obtaining a sterile solution and second, it was necessary to perform a surgical operation to obtain the glandular tissue from which the extract was made Various other materials for protein and shock therapy have been suggested and employed, e g milk [54 146 179] A proprietary preparation called lactigen has been used in non specific protein therapy [53] T A B [15 8 108] and Dmelcos vaccines autogenous vaccines [134 174 184] Ducrey bacillus vaccine [177] solganol B [108 1 1] blood sera and tuberculin have been employed Tamura[171 177] has grown the virus on tissue Tyrode medium and used this culture Typhoid vaccine was employed on 4 of 17 cases at a station hospital in India [43 107] Lygranum[109] and mouse brain antigen have also been used [77 1 1 1 4 188]

In this form of therapy, however, Frei antigen stands in the lead [18 106 148 1 4 1 1 8 17] In 1928 Hermans[80] reported good results from the use of intravenous injection of the antigen,[77] in 1931, Sven Hellerstrom[8] reported at the Societe Dermatologique de Strasbourg his first case of Nicolas Favre s disease favorably influenced by intravenous injections of lymphogranulomatous antigen of human origin In 1932, Gay Prieto' [68] published his results This investigator held that intravenous injections of the antigen is the treatment of choice and should always be instituted prior to the consideration of surgery Both Martin and the author observed striking results from the intracutaneous and subcutaneous but especially from the intravenous injection of this antigen in cases other than rectal stricture It has also been used intradermally [1 8] It must be confessed, however that encouraging though many of its effects are, even this therapy is not standard Flandin and his associate Turiaf,[56] of the Hopital Saint Louis write In a process of inguinal poradenolymphitis in full activity and developing for several months in spite of powerful therapeutic intervention (radiotherapy iodotherapy, modified local injections) intravenous injections of lymphogranulomatous antigen brought about a rapid and complete cure

There is no doubt that the therapeutic influence of intravenous injections of Frei antigen however uncertain it may be does not merit that this be allowed to fall into the discard We have seen that it brings about total cures either at the beginning of the malady or even in certain cases which did not yield to other medications When it does work, it is remarkable for its rapidity and definiteness

A colleague Jausion remarks This specificity is by no means certain What

ever it may be, our results merit that this method be employed" In long standing vulvar ulcers, chronic in type, intensive courses of female hormone were prescribed by Coutts,[79] concomitant with sulfonamide therapy

Penicillin has been employed in many instances [160] although our experience has been limited prior to and following radical surgical extirpation (see chapter on stricture) The same may be said of streptomycin to a lesser degree

Physical

This type of therapy is used only as an adjunct to some form of systemic treatment Hellerstrom favors the use of x rays as a preparation for surgery Lebeuf[102] believed in a combination of injections of anthiomaline and radiotherapy Stammers[167] treated cases in the second stage of the disease with anthiomaline, finding that in combination with sodium antimony tartrate and the sulfonamides or T A B, most of the cases were cured and returned to useful pursuits in three or four weeks Ultraviolet rays radium[148 150] and the mercury quartz lamp have been employed Carbon dioxide snow was used by Mentzer and Allen[11] with the medium contained in hollow metal, cervical dilators, and applied for 90 seconds results, however, were disappointing [0] Diathermy was used in treatment by Martz and Foote,[11] and Shackelford and Weinberg [164] The latter investigators state that the method offered very little, if any curative effects Conversely, Martz and Foote had diametrically opposite results in their cases

Surgical

Wilmoth[185] postulated Early enucleation of the involved glands, instead of the so called expectant treatment, will materially lessen the period of disability in the great majority of cases, and is the method of choice in treatment of this condition' Hellerstrom, Frei,[60 6] Barthels and Biberstein[7] are also notably among those who favor partial surgery [79] [5 70 95 115 119 133 1 8 175] It is certainly reasonable to assume that incision and drainage of any abscessed area will be of benefit Therefore conservative surgery consisting of incision, aspiration of pus and plugging with antiseptic gauze may be advocated Miskjian[11] obtained good results with the old fashioned seton

Complete enucleation, on the other hand, is of questionable value In a very advanced stage, where the adhesions have progressed to the vicinity of the large vessels, it is impossible to extirpate all the infected material, and that remaining tends to proliferative continuation leading to adhesions, scars and shrinkage, with possible resultant obstruction of the large blood and lymph vessels Where satisfactory extirpation has been accomplished, there are still the sequelae to be considered Among these have been noted recurrent lymphangitis with pyrexia and joint pains, elephantiasis and very often, the anorectal syndrome However, in the treatment of stricture, surgery is the only method available In one of the cases coming to autopsy,[0] thrombophlebitis of the superior mesenteric vein was present, together with multiple intrahepatic abscesses Two cases of squamous cell carcinoma occurred in the series reported by Barber and Murphy [6] Binkley and Derrick[12] reported that 8 cases out of 19 with squamous cell carcinoma gave a positive Frei test, the remaining 11 being strongly suggestive of pre existing anal manifestations of lymphogranuloma venereum The same authors quoted Cardwell and Pund s finding of an epidermoid anal carcinoma in which the Frei test was positive Another finding was reported by Lisa, a rectal adenocarcinoma with a concurrent squamous cell anal carcinoma in a colored male having lymphogranuloma venereum Deibert and Greenblatt[14] reported a 24 year old Negress having an epidermoid carcinoma of the vulva Recent studies by Coutts and Davila[1] proved an unquestionable relationship between Buerger s syndrome

and l venereum It has been encountered more frequently among adults in the age group from 25 to 45 The author quoted May as having reported a second case of Buerger's syndrome and having maintained its lymphogranulomatous origin In an article published by him in 1943, he reviewed 11 cases of Buerger s disease seven of which gave positive Frei tests, the remaining 4 negative a rather pertinent finding Multiple papillomata were reported as sequelae by Klein[97] in a study of 24 cases treated by roentgenotherapy The Frei test was positive in 18 negative in 2 and unrecorded in 4

Von Veress[1] has evolved a form of treatment which seems to include the most useful features of the various proposed remedies He found the best treatment to be a compromise, applying fairly energetic local measures but avoiding more extensive surgical operations Most important is the improvement of the general condition through iron, arsenic quinine strychnine, quartz light irradiations and a diet rich in vitamins For stimulating the sluggish healing tendency, milk or other protein injections, in frequent small doses, are of value The inguinal region is irradiated with weak doses of x ray 2x through 2 to 3 mm aluminum filter in the course of eight to ten days until the S E C is reached After an interval of four weeks the irradiations are repeated in the same way so that the sick glands are kept under constant x ray influence The softened foci are punctured with the galvanocautery in such a way that the cautery is kept in the glands three to four seconds after the skin is punctured After the puncture a Bier s suction pump is put on daily for ten to fifteen minutes followed by moist dressings or hot compresses After a few days the puncture canals soften and with some cotton on a stick, dipped in carbolic acid the abscess cavities and the sinus ducts which are sometimes very long, can be thoroughly wiped out Finally gauze strips soaked in trypaflavine are inserted as drains In this way large abscesses and long fistula ducts close in a week or two and a complete cure is obtained in four to eight weeks " Occasionally it has been noted that these lesions are capable of self healing if left untreated

Seley, Vernick and Goldman[1 7] reported a case of a colored female, aged 25 and 4 months pregnant She had reacted positively to the Frei test and in addition presented a reversed albumin globulin ratio No apparent improvement of her rectal stricture was noted either with the Frei antigen or other known treatment At the fourth month of her pregnancy she noted that the stricture was becoming rapidly absorbed She was delivered at term by caesarean section due to cephalopelvic disproportion One month later there were no rectal complaints and normal evacuations and no further evidence of the stricture were visualized

Goldman[70] reported a similar case in which most of the known treatments for the local lesion had failed The patient became pregnant, and at the fourth month the stricture had softened and was dilatable Nine months following delivery a positive Frei test was still demonstrable but there was no rectal complaint and the bowel movements were normal

In general, the prognosis is good so far as the inguinal phase is concerned, but there is usually the possibility that more serious or less amenable conditions may develop such as the genito anorectal syndrome or elephantiasis In this event the outlook is less sanguine

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CHAPTER 12—PART 1

Inflammatory Stricture

STRICTURE OF THE RECTUM

Definition

Stricture of the rectum is an organic narrowing of the lumen of the bowel by fibrous tissue involving the mucous membrane submucosa and muscular coat and characterized by progressive constipation tenesmus and mucopurulent discharge The condition is separate and distinct from anal stenosis, which refers to contraction of the modified skin lining the anal canal [1 9]

Incidence

As previously mentioned, our experience with lymphogranulomatous venereal stricture has been derived from several large proctologic clinics over a period of approximately sixteen years

Age Rectal stricture is most common between the ages of 20 and 40 [11 31 44]

Sex It is more common in females than in males in the relation of four to one [68 8 103]

Sex	Number of Cases
Females	571
Males	133
Total	704

Race Stricture is more frequently met with in the colored race, due for the most part to a marked scar forming tendency termed by Rosser [100 117 118 120] fibroplastic diathesis, and the apparent peculiar susceptibility to lymphogranuloma venereum

Race	Number of Cases
Colored	485
White	219
Total	704

Location The vast majority of strictures are located in the lower rectum In a few instances the sigmoid has been involved, and in one case the tubular stricture extended from the lower rectum to the splenic flexure Involvement of the descending colon [109] and sigmoid has been cited [31 44 4 3 109 118 13 138 139]

Classification

Strictures of the rectum are classified according to their shape as annular or tubular The *annular* variety represents a ringlike constriction involving the entire circumference of the rectum and for the purpose of description is considered less than one inch in length (Fig 280) [32 37 44 4 104 113 138] The *tubular* variety is so specified to denote a cannular or tubelike contraction of the entire circumference of the rectum and is described as being one inch or more in length (Fig 281)

The term linear stricture is sometimes mentioned to represent a narrowing of only part of the lumen Many authors consider the annular variety as the most frequent

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In men prostatic and urethral infections exert an important influence The usually offending organisms in the catarrhal type are the *B coli* strains of the staphylococci and streptococci Involvement of the mucosa by the gonococcus or invasion of the perirectal structures from the pelvis is considered important in the formation of stricture[3, 41, 9, 60, 10, 119, 18] Whether the *Treponema pallidum* is a specific cause is open to debate The peculiar characteristics of the disease which is one of the chronic granulomata is readily appreciated in that nodular and gummatous enlargements may occur about the blood vessels As in other parts syphilitic ulceration of the submucosa is followed by extensive infiltration with fibrous tissue

In thirty odd cases studied histologically, perivascular round cell infiltration and endothelial thickening of the blood vessels were noted but no spirochetes could be demonstrated at any time In one group of our cases, Wassermann reports were noted in 91 instances of which 45 were positive or 49 5 per cent Yeomans[139] reported 42 cases considered clinically luetic The author stated that gummata obliterating endarteritis and proliferation of the intima of the rectal veins even progressing to obliteration result in rectal mucosal ulceration and unless the ulceration is healed promptly, rapid production of connective tissue occurs the contractions producing stricture Blood Wassermanns were positive in 31 negative in 5 and unrecorded in 6 cases occurring in the anal canal and rectum were confirmed by digital palpation

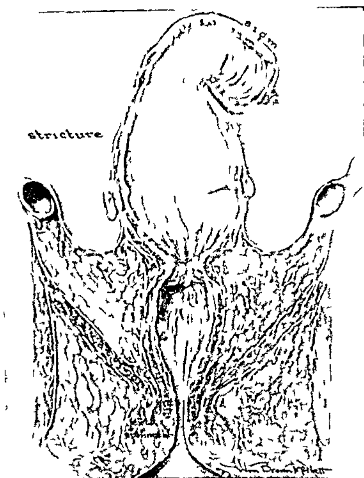


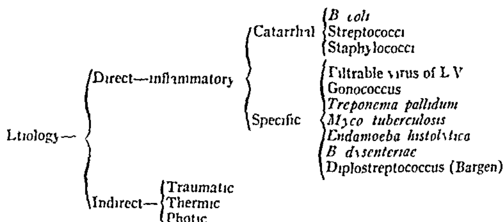
Fig 280 Annular stricture of upper rectum

but such is not the case unless congenital and acquired anal stenoses are included. Undoubtedly, as seen in any large proctologic clinic, the tubular variety represents the greater percentage.

Congenital stricture of the rectum is extremely rare and will be found described under Malformations of the Anus and Rectum, Chapter 3, page 82. Since congenital narrowings are located usually at the anorectal line, which embryologically represents the junction of the hindgut and proctodeum,[6] they are termed "stenosis" and, accordingly, will be described under that heading. Yeomans[130] personally observed 119 cases of rectal stricture, 8 of which were recorded by him as congenital.

ETIOLOGY

It seems expedient to mention at the very beginning of our discussion on etiology that, as based on a study of 700 cases of inflammatory rectal stricture in which every available means of proof or disproof was utilized, both Martin[92,93,94,95,96,97,98,99,100] and the author[8,10,11,14,17] feel convinced that in the light of our present knowledge the vast majority of these rectal strictures are the result of invasion by the specific virus of lymphogranuloma venereum. Fraser, Kane and Parks,[48] Johnston,[1] Palmer, Kirsner and Rodaniche,[109] Pearce, Bower and Burns,[111] and Woods and Hanlon also concurred in these findings.[137] In addition there is much supportive evidence especially the experimental work of Frei,[47,49,50] Hellerstrom[61,62,63,64] and Levaditi,[83,84] as well as that of others.[2,13,4,26,27,29,3,4,46,47,5,6,66,67,69,7,73,80,81,8,89,90,91,100,10,110,111,115,1,3,1,7,130,131,13,134,136,140] There are, as is well known, other factors causing this condition, so that all will be considered under the following classification:



As to the etiologic factors, the direct causes are catarrhal[71,109] and specific.

Indirect causes are traumatic,[40,109] photic[73] and thermic.

Inflammation. Independent of the cause, acquired strictures are the results of scar tissue formation induced by the products and processes of inflammation.[109] In other words, any cause which brings about destruction of the coats of the rectum, whether it arises from some adjacent structure outside the rectum or originates from one within its lumen, is conducive to stricture. Scar tissue is the result of an infection which may be brought about by either the simple catarrhal or the specific types of organisms.

The infection may be intrinsic as an ulcerative lesion of the mucosa, or extrinsic, as a pathologic process outside the rectum or in some adjacent structure. It is reasonable to assume from the marked preference which stricture manifests for the female sex and Negro race, especially between the ages of 20 and 40, which period represents the height of sexual function, that this syndrome is due in a large proportion of cases to some pelvic inflammatory disease, probably lymphogranuloma venereum.

lumen As Babcock[4] remarks "The rectum shows a marked tendency to stricture after division and suture, more so than any other portion of the intestinal tract" Injuries

Other Causes Among the chemical factors may be mentioned the use of caustics and acids The injection of phenol in oil for hemorrhoids has been followed by slough

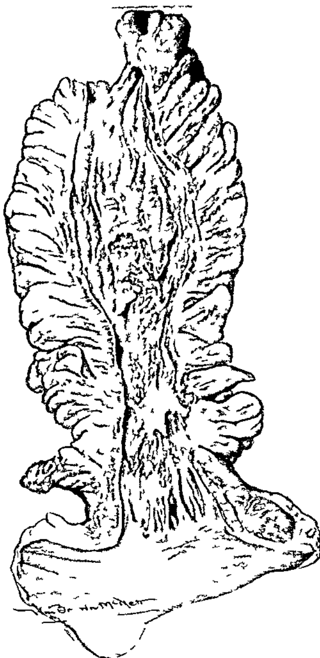


FIG 282 Tubular stricture of rectum showing almost complete destruction of the mucous membrane

from a fall foreign bodies, gunshot wounds careless instrumentation childbirth[10, 15, 1] and impalement may be cited as additional causes

ing of the mucosa with resultant contracture of the scar tissue[118] Photic causes are burns from the intra and extrarectal use of radium[7, 30, 38, 1, 83, 13] Enemata of boiling

Involvement of the rectum by the *Myco tuberculosis* may result in organic narrowing of its lumen because of the extensive and marked conversion of connective tissue into the fibrous variety[8, 47, 49, 108] This is tions involving a small segment, varying in size from a pinhead to a tangerine or there may be a more diffuse involvement, producing a frank rectal stricture They may or may not be ulcerated In the authors

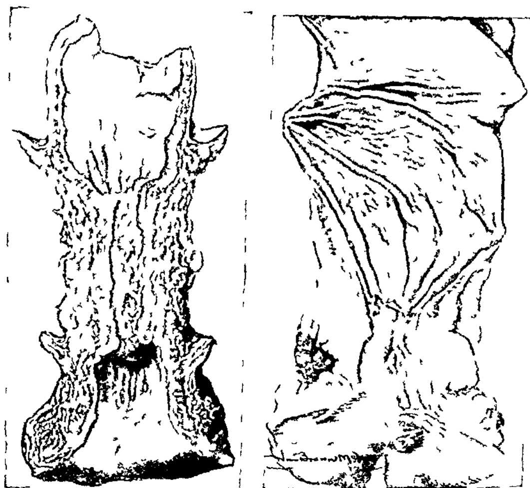


FIG 281 (*Left*) Tubular stricture of rectum (*Right*) Short tubular stricture of rectum

especially true in the hyperplastic type of tuberculosis

Similarly chronic ulceration due to the *Endamoeba histolytica B dysenteriae*[1, 4] or the diplostreptococcus of Bargen[23] may be followed by stricture of the rectum

Although extremely rare infiltration with narrowing of the rectum and sigmoid has been reported in cases of Hodgkin s disease[39, 68] Spiesman and Rubenstein[1-] reported a case of Hodgkin's lymphogranuloma as the causative factor of a rectal stricture Another case was reported by Gallant and De Vinals This type of stricture may consist of varying nodular infiltra case the stricture was located from approximately 7 to 8 cm cephalad to the anal verge The surface was nodular, granular ulcerated and "beefy" in appearance

Trauma Traumatism exerts an important influence, since it is often followed by infection and scar tissue Under this heading may be mentioned various operative procedures, especially an extensive hemorrhoidectomy[7, 109, 137] The constriction of the anus due to excision of too much anal skin is, however, classed as a stenosis and not a true stricture

Fistulectomy and resection occasionally are followed by narrowing of the rectal

lumen As Babcock[4] remarks "The rectum shows a marked tendency to stricture after division and suture more so than any other portion of the intestinal tract" Injuries from a fall foreign bodies gunshot wounds careless instrumentation childbirth[10, 19, 1..] and impalement may be cited as additional causes

Other Causes Among the chemical factors may be mentioned the use of caustics and acids The injection of phenol in oil for hemorrhoids has been followed by sloughing of the mucosa with resultant contracture of the scar tissue[118] Photic causes are burns from the intra and extrarectal use of radium[7, 30, 38, 1, 89, 13] Enemata of boiling



FIG 282 Tubular stricture of rectum showing almost complete destruction of the mucous membrane

fluids, careless use of the cautery and diathermy are included under thermic causes

PATHOLOGY

The formation of a stricture is not difficult to understand if the pathologic processes which take place are carefully followed It should be borne in mind, however, that the inflammatory process may attack any layer of the rectum or the tissues outside its wall If it comes from within, the irritation (see etiologic causes) results in erosion of the mucous membrane upon which infection is superimposed (Fig 282) With continuation of the etiologic irritant, the inflammatory process becomes subacute and finally chronic in nature, so that the various layers of the rectum and the tissues outside its wall are gradually involved by continuity and contiguity of structure As a result of this chronic inflammation, much young fibroblastic tissue is deposited in the submucosa as well as in the other coats, which gradually leads to thickening of the visceral wall This, in itself tends to encroach on the lumen of the rectum By subsequent contraction of the maturing fibroblastic tissue this thickening becomes markedly increased, so that there eventually results a firm, inelastic, permanent narrowing to which the term stricture is applied [22, 138]

On the other hand, if the initial focus is outside the rectum as we believe is most frequently the case the extramural network of lymphatics becomes invaded As the inflammatory process gradually becomes chronic the mural tributaries, namely the inter and intramural groups are invaded by extension As a result of the inflammatory process, fibrous tissue is deposited in the various layers of the rectum so that thickening occurs which brings about narrowing of its lumen As the process continues and additional fibroblastic tissue is deposited, subsequent contraction ensues so that finally an organic stricture is formed

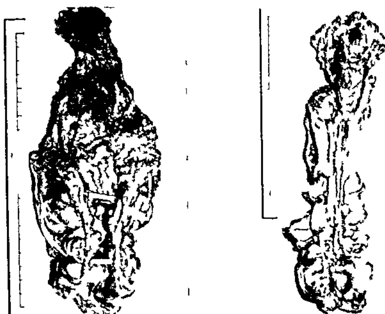
At first, erosions of the mucous membrane are noted, followed by ulcerations so that the surrounding mucosa appears altered and somewhat lusterless (Fig 281) To the touch, the involved area is thick and firm, while later it feels leathery, with loss of elasticity and distensibility It is more or less irregular, markedly thickened, and the mucous membrane is found to be adherent to the tissues beneath In the deeper layers of the stricture fibrous tissue is seen involving all coats of the rectum although the greatest amount of involvement is in the submucosa Fistulous tracts may be found passing to the perirectal tissues, to adjacent structures such as the bladder urethra and vagina or through the skin Ulceration is usually marked and occurs early The discharge is frequently abundant, mucopurulent and often sanious Above the stricture, the rectum is dilated and ballooned out, owing to the pressure of feces In this location, ulceration is frequent because of irritation from the retained fecal contents and bacterial activity Polypoid growths are not uncommon in this site [4, 88]

Below the stricture, the mucous membrane appears gray and is tough and dense, with loss of the normal velvety character Here ulceration is less common The mucosa and anal skin are often thrown into patchy thickenings and papillomatous vegetations [3] which may project into the lumen and through the anal orifice On section the tissue cuts with difficulty and is shown to be white, hyalinized and glistening

HISTOPATHOLOGY

The histopathologic appearances of inflammatory rectal stricture are nearly always nonspecific regardless of etiology save in the occasional case where typical tuberculous granulation tissue is characteristic Rarely in lymphogranuloma venereum does one find the small abscesses which are observed uniformly in the lymph node Usually however, the following changes are noted the ulcerated mucosa is replaced by simple granulation tissue, the entire rectal wall is more or less heavily infiltrated by a chronic inflammatory cellular exudate in which lymphocytes and plasmocytes pre

PLATE 6



(*Left*) Inflammatory stricture showing tubular narrowing stricture separated by sticks Removed by abdominoperineal proctosigmoidectomy without colostomy and with preservation of anal sphincters (*Right*) Long tubular stricture showing marked narrowing Abdominoperineal proctosigmoidectomy without colostomy anal sphincters preserved

dominate,[ ] monocytes and macrophages being in the background a zone of neutrophilic leukocytes lies along the lumen margin and may with eosinophils be sprinkled sparsely throughout [ ] fibroblastic prolif

SYMPTOMS

In all cases the symptoms vary with the degree of completeness of the constriction usually *dependent on location and duration*

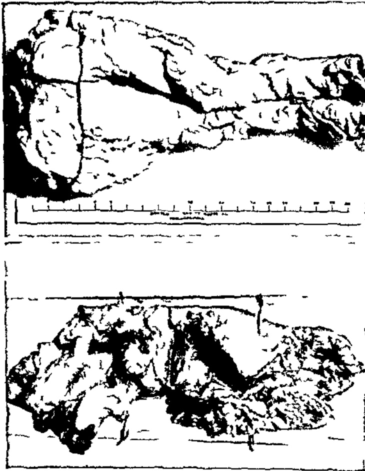


FIG 283 (*Top*) Gross specimen of tubular stricture of rectum removed surgically Frei test positive microscopy of tissue characteristic of lymphogranuloma venereum (*Bottom*) Tubular stricture of the rectum Gross specimen

eration is prominent in all coats of the bowel later forming a dense collagenic mat which may largely replace the original structures [1 3] blood vessels show the proliferative thickening common to any chronic inflammatory area and the environs of the lesion are usually surrounded by a round cell collar The histopathology was reported in a case by Rendich and Poppel [118] epithelial acanthosis round cell infiltration and histiocytes were present in a biopsy specimen

Primarily a bearing down sensation or a feeling of discomfort in the rectum is frequently present Constipation is progressive a constant desire for stool is complained of by the patient, so that futile and painful straining (tenesmus) soon develops The evacuations always incomplete and increased by the u e of drastic purgatives, become liquid and tinged with blood

As the condition progresses there is almost a constant dribbling of mucus pus and feces Many writers stress the occur

rence of ribbon shaped stools in stricture of the rectum, but in our experience this is uncommon except where the degree of constriction is marked and where it is located immediately above the anorectal line In anal stenosis, however, ribbon shaped stools are of frequent occurrence [4, 71, 101, 13] Soreness about the anus is frequently present, due to excoriation resulting from the irritating discharge Concomitant gastrointestinal symptoms, such as anorexia nocturnal meteorism coated tongue diarrhea (with concurrent pellagra) and gastralgia, as well as loss of weight and general impairment in health, are later manifestations Not unimportant is the previous history, especially of anorectal and pelvic operations and disorders Obviously, an investigation of the possibility of a venereal background should not be omitted In a series of 216 cases, of which 173 were females, 143, or 82 6 per cent gave a history of previous pelvic inflammatory disease A history of lues, either the initial lesion or the constitutional syndrome, was elicited in 42 cases Gonorrhea was also recorded,[101] as was inguinal adenitis (bubo) [109] Nausea vomiting and anaphrodisia were reported in another case [31] Dyschesia[110] and rheumatoid arthritis of 21 years' duration were also recorded [109]





Fig 284 (*Left*) Photomicrograph showing area of suppuration surrounded by epithelioid cells arranged in palisade formation (*Right*) Low power magnification of rectal stricture In lower right portion of section mucosa is seen to be replaced by granulation tissue Entire wall is heavily infiltrated by chronic inflammatory cellular exudate which separates the fibers of the muscularis and is accompanied by fibrous proliferation No tuberculoid formation is seen

Diagnosis

A history of constant soiling by feces, blood and pus, is suggestive of an inflammatory stricture, especially when cited by a colored female between 20 and 40 years of age

Inspection Although diagnosis by inspection is not absolutely confirmatory to the careful observer it offers more than a suspicion of the pathology present Not infrequently the region about the anus is moist and glued together by the thick



FIG 285 Proctoscopic view of tubular stricture (a) Actual size of lumen (A) Inferior aspect of the stricture enlarged (B) Appearance of the wall (C) Superior aspect as seen through the stricture

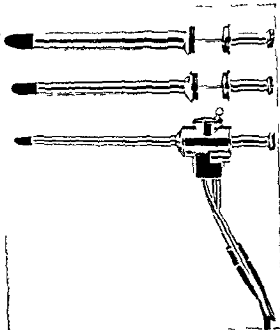


FIG 286 Stricturoscope



FIG 288 Colored female Inflammatory stricture of rectum removed by proctosigmoidectomy



FIG 287 Proctoscopic view of inferior border of stricture

mucopurulent discharge Upon separation of the buttocks, fecal matter mixed with blood and pus may be seen seeping through the anal orifice Hypertrophied skin tags condylomata of various sizes and one or more fistulous openings are not uncommon

Digital Examination Since approximately all inflammatory rectal strictures are within reach of the finger the diagnosis should not be difficult As the gloved finger is inserted in the anal canal, some degree of muscular relaxation will be noted in long standing cases owing to fatigue of the external sphincter Yet gentleness should attend this procedure since pain and dis

rence of ribbon shaped stools in stricture of the rectum, but in our experience this is uncommon except where the degree of constriction is marked and where it is located immediately above the anorectal line In anal stenosis, however, ribbon shaped stools are of frequent occurrence [4, 71, 101, 137] Soreness about the anus is frequently present, due to excoriation resulting from the irritating discharge Concomitant gastrointestinal symptoms, such as anorexia nocturnal meteorism, coated tongue diarrhea (with concurrent pellagra) and gastralgia, as well as loss of weight and general impairment in health, are later manifestations Not unimportant is the previous history, especially of anorectal and pelvic operations and disorders Obviously, an investigation of the possibility of a venereal background should not be omitted In a series of 216 cases, of which 173 were females, 143, or 82 6 per cent, gave a history of previous pelvic inflammatory disease A history of lues either the initial lesion or the constitutional syndrome, was elicited in 42 cases Gonorrhea was also recorded,[101] as was inguinal adenitis (bubo) [107] Nausea vomiting and anaphrodisia were reported in another case [31] Dyschesia[116] and rheumatoid arthritis of 21 years duration were also recorded [109]

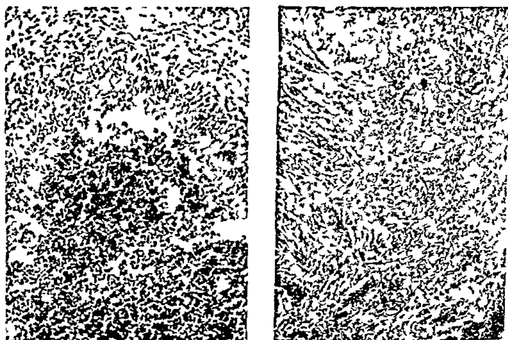


Fig 284 (*Left*) Photomicrograph showing area of suppuration surrounded by epithelioid cells arranged in palisade formation (*Right*) Low power magnification of rectal stricture In lower right portion of section mucosa is seen to be replaced by granulation tissue Entire wall is heavily infiltrated by chronic inflammatory cellular exudate which separates the fibers of the muscularis and is accompanied by fibrous proliferation No tuberculoid formation is seen

Diagnosis

A history of constant soiling by feces, blood and pus, is suggestive of an inflammatory stricture especially when cited by a colored female between 20 and 40 years of age

Inspection Although diagnosis by inspection is not absolutely confirmatory to the careful observer it offers more than a suspicion of the pathology present Not infrequently the region about the anus is moist and glued together by the thick

be attended with great care, since forcible insertion not only causes pain to the patient but is dangerous as well because the diseased tissue is so friable that hemorrhage and perforation may ensue Through an ordinary proctoscope, the stricture (or in the case of the tubular variety, the lower border of the stricture) is noted by its pale, leathery and thickened appearance (Fig 285)

For examination through and above the stricture the instrument shown in Figure 286 has proved of service The introduction of the stricturoscope should be cautiously performed, preferably with the patient in the inverted position and with the instrument being advanced under direct visualization In this manner the type of stricture, whether annular or tubular, its length and degree of ulceration may be determined

In each case of stricture especially when located in the sigmoid or at a high level in the rectum, roentgenogram should be taken after an opaque enema (Figs 289 290) In this way the irregular deformity will be noted The method devised by Martin Sturr[120] and the author[8] has proved of distinct value in estimating the accurate length and site of rectal strictures

Klein, [3] in a roentgenologic study of lymphogranuloma venereum affecting the rectum found the following various types of narrowing present

1 Narrowing or stenosing distended rectosigmoid pouch with rectal stenosis
2 Rectosigmoid stenosis and tubular stenosis of the rectum
3 Marked rectal stenosis sigmoid and distal descendens with small sinus formation
4 Stenosing irregularity and rectosigmoid fixation
5 Smooth stenosis of rectosigmoid suggesting inflammatory stricture
6 Extensive rectal stricture formation with perianal sinuses
7 Irregularity of the anal canal with smooth stricture of distal two thirds of the rectum
8 Concentric stenosis of the rectum
9 Rectosigmoid stricture with large sinus tract
10 Rectal stenosis with numerous retention sinuses
11 Sausage shaped deformity of the rectosigmoid

As a routine procedure a blood and spinal fluid Wassermann as well as a Lygranum test should be done in each case

Differential Diagnosis

Ordinarily it is not difficult to diagnose a rectal stricture but to determine the cause of the process which bears influence is another matter entirely this is not always an easy task The presence of amebiasis may be diagnosed by isolation of the *Endamoeba histolytica* bacillary dysentery by the characteristic bacterium and positive agglutination test of the blood tuberculosis by histologic and bacteriologic studies syphilis, by means of the blood Wassermann Kahn and Kolmer tests gonorrhea, by isolation of the gonococcus of Neisser and lymphogranuloma venereum by the intradermal injection of the Frei antigen and microscopy of tissue Allen and Mentzer[1] found this last procedure most valuable but in the event of its being the sole evidence of the disease it should be substantiated by an inverted test, in which the antigen prepared from tissue of the patient is injected into a known case of lymphogranuloma venereum Coutts, Opazo and Montenegro[37] stress the necessity of classifying lymphogranulomatous conditions referable to the rectum and performing careful radiologic investigations in the ileum colon and rectum prior to surgery as a point in differential diagnosis to rule out other possible causes

Not infrequently the physician will be called upon to distinguish between an inflammatory and a malignant stricture Usually a stricture caused by carcinomatous infiltration occurs in the white race between the ages of 35 and 60 Here the mass is hard and nodular and confined more to one side than the other whereas the inflammatory stricture is firm and the entire circumference is involved uniformly In cancer the mass grows rapidly Glandular involve

comfort are not unusual As the finger is advanced, the stricture will be felt as a firm, inelastic narrowing, usually involving the entire circumference of the rectum If the lumen of the stricture is of sufficient size to admit the tip of the index finger, the finger can usually be passed to its entire length However, such introduction should



Fig 289 Case of lymphogranuloma venereum (*Left*) Roentgenogram showing marked deformity and irregularity of entire rectum from anorectal line to rectosigmoid junction The walls are ragged, indurated and fixed with considerable narrowing of lumen (*Right*) Barium enema study showing a constant linear filling defect, starting at the level of the iliac colon, with straightening marked narrowing and annular constriction involving sigmoid colon and rectum The walls appear ragged and inflexible the caliber of the lumen is diminished and incompletely outlined with barium



Fig 290 Case of lymphogranuloma venereum (*Left*) Barium enema study revealing small, irregular, constant constricting defect in the terminal rectum The upper rectum and sigmoid colon appears atonic, dilated and redundant being completely filled with barium (*Right*) Roentgenogram of barium enema study showing the presence of a constant, irregular constricting lesion in the distal portion of the rectum with loss of normal contour The bowel course is tortuous and the lumen greatly diminished in caliber

Table 25 Differential Diagnosis

	Nonmalignant Stricture	Malignant Stricture
Age	17 40	40 60
Race	Colored	White
Sex	Female	Male
Palpation	Firm but not nodular orifice of stricture feels like a circular ridge	Hard nodular edges thickened irregular induration is marked new growth most prone to cause obstruction
Involvement	Entire circumference involved uniformly	More on one side than the other not uniform
Odor	Fetid	Fetid and characteristic
Ulceration	Above and below the stricture	Begins in growth
Metastasis	Not present	Present
Course and progress	Chronic and slow	More rapid
Glandular involvement	Infrequent and less marked	Always present comparatively early
Loss of weight	Gradual	Pronounced and rapid cachexia early
Laboratory		
Biopsy	Suggestive of L V	Positive for cancer
Frei test	Usually positive	Negative

who stated that heavy lymphoid infiltration microscopically accompanied by the presence of giant cells and epithelioid cellular elements usually confirms the presence of infectious granuloma Diverticulitis should also be considered

Greenblatt found the anal syndrome to show polypoidal and lobulated growths about the anal orifice occurring either singly or in combination with genital and rectal involvement In the incipient stages indurated rubbery anal tabs are present which may be mistaken for *hemorrhoidal* tags

The rectal stricture is frequently found without other manifestations of lymphogranuloma venereum Knott Bernstein et al[74] postulated that the determination of total serum protein and albumin globulin ratios are of little value in differential diagnoses and that the best criterion is the clinical appearance of the lesion The former findings are not alone sufficient for diagnosis

Complications and Sequelae

Usually inflammatory strictures are so progressive that due to absorption of the retained products severe toxicity ensues with loss of weight and general debility Abscess and fistula frequently multiple are common These fistulae may also rupture into adjacent structures such as the vagina, bladder or urethra Rectovaginal fistula has been reported as a complication [41 4 4 101 104 113 138] as has also recto Fallopian fistula[137] Thrombophlebitis of the mesenteric vein and multiple intra hepatic abscesses were found at autopsy in a case reported by Barber and Murphy Pregnancy with concomitant rectovaginal fistula and rupture of the rectum during delivery occurred in a case reported by Kassebohm and Schreiber in 1936 In a search of the literature, the authors failed to find a case of rupture of the rectum during delivery Rectovaginal fistula complicating pregnancy with concurrent rectal stricture has also been reported[31] A case of pregnancy and cholecystectomy in addition to rectal stricture was cited by Ewell and Jackson[4] Two instances of *pregnancy* complicating stricture of the rectum have been recorded[116 1] Peritonitis may occur from perforation cephalad to the peritoneal reflection, and complete obstruction may ensue [111]

Our experience with complicating factors associated with *lymphogranulomatous* strictures and esthiomene has been discussed elsewhere Several instances of rectovaginal fistula are cited (see Fistula) Many have

ment is noted and cachexia appears with loss of weight. A biopsy for histopathologic study should be made a routine procedure in each case.

Deibert and Greenblatt[40] cited the occurrence of an epidermoid carcinoma in a 24 year old Negress as a direct sequel to lymphogranuloma venereum. Fraser, Kane and Parks[49] reported a series of 117 patients. Of these, six had had epidermoid carcinoma with a previous history of lues venerea in 3, *postchancroid state in one*, *Trichomonas vaginalis* in one, and lymphogranuloma venereum in one. All of the six lesions were located in the rectum. Barber and Murphy[illegible] reviewed a series of 55 cases; two had developed carcinoma following lymphogranuloma venereum. *One was a squamous cell* type involving the mucocutaneous junction, the other an adenocarcinoma involving the rectal ampulla. This also followed lymphogranuloma venereum infection.

In a roentgenologic study of 24 cases of lymphogranuloma venereum, Klein[77] reported a malignant stricture of the rectal ampulla; another case, a proximal rectal carcinoma with annular constriction due to lymphogranuloma venereum.

Wright, Berg, Bolden and *Freeman*[139] report the case of a colored female, aged 45, who, when first examined, presented a large, sloughing pedunculated granulomatous supergrowth involving both labia extending anteriorly from the pubis and *including the rectal sphincter posteriorly*. This later became entirely destroyed, as was also the septum between the vagina and lower rectum. A terminal formation of squamous cell carcinoma occurred, subsequently resulting in her death. She had had *a rectal stricture due to* lymphogranuloma venereum.

Binkley and Derrick[28] reported that of 87 cases of stricture 11 were due to lymphogranuloma venereum.

Ewell and Jackson[illegible] quoted Bunting

TABLE 24 DIFFERENTIAL DIAGNOSIS

	Inflammatory Stricture	Hyperplastic Tuberculosis	Sarcoma	Syphilitic Gumma
Age	17 40	20 30	30 50	Middle life
Race	Colored	White and colored	White	White or colored
Sex	Females	Males	Males	Females
Onset	Insidious	Insidious	Rapid	Insidious
Characteristics	Uniform narrowing of entire circumference firm inelastic ulceration above in and below stricture	Pale and dry thick rigid ulceration infrequent	Hard or soft and spongy begins as small movable nodule but later fixed	Round or oval nodule —pea to an orange single or multiple painless bluish or purple in color firm to touch movable and ulcerates regularly Responds to antiluetic treatment
		Tuberculosis elsewhere	Cachexia and ascites metastasis	Manifestations elsewhere
Laboratory				
a Intradermal test	Frei usually positive	Tuberculin positive		
b Stools		Tubercle bacilli only occasional		
c Biopsy of tissue	Not characteristic	Miliary tubercles	Positive for sarcoma	
d Guinea pig inoculations		Shows tuberculosis		
e Blood				Wassermann Kolmer positive

TABLE 25 DIFFERENTIAL DIAGNOSIS

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Our experience with complicating factors associated with lymphogranulomatous strictures and esthiomene has been discussed elsewhere Several instances of rectovaginal fistula are cited (see Fistula) Many have

been found associated with pregnancy In one instance, adenocarcinoma was found superimposed on lymphogranuloma venereum stricture[1] (see Chap 19, Malignancy)

PROGNOSIS

In stricture of the rectum the prognosis is variable, depending on the etiology, extent, and the age and condition of the individual In general terms it may be said that whereas the malignant type is fatal unless resection is performed, the prognosis is invariably favorable in those strictures of lymphogranulomatous origin provided proper surgical treatment is instituted On the other hand prognosis is guarded when the stricture originates in a bacillary or amebic infection

TREATMENT

The initial purposes of the author in preparing a treatise on diseases of the lower bowel were, primarily, to make available to those interested in this subject a condensed correlation of the material with description and evaluation of the same and, secondly to incorporate the author s experience where such inclusion seemed warranted Consistent with the first, the various forms of therapy employed will be discussed for purposes of reference

It should be fully understood that in every instance effort should be made to ascertain the cause and any influencing or contributing factor in order that the proper remedial measure be instituted for its correction

The various methods employed in the treatment of inflammatory stricture of the rectum are considered here under the respective headings of Nonsurgical and Surgical

Nonsurgical MEDICINAL TREATMENT Instillations of ichthyol from 10 to 20 cc of a 25 per cent aqueous solution twice daily, are soothing to the mucous membrane and will assist in diminishing tenesmus Irrigations of hot water, 110° F, potassium permanganate, 1 8 000 or S T 37 (hexylresorcinol), 1 8 once or twice daily, will tend to cleanse the inflamed mucosa l or topical applications to ulcerated areas either 5 or 10 per cent silver nitrate may be employed

The passage of stools is facilitated by the administration of liquid petrolatum, from a half to one ounce, night and morning as indicated

In one group of our cases we instituted sulfonamide therapy in 45 instances, the majority of tho e so treated showed an improvement of the ulceration but no effect on the stricture itself Mentzer and Allen[103] reported remarkable improvement in their cases of ulceration but the stricture remained unaffected Operative cases given this drug seemed to progress more satisfactorily In almost every instance, the period of convalescence appeared to be decreased

Eighty grains were administered per oram daily for two days thereafter, approximately 40 grains were given each day for seven days When ambulant, patients were given between 10 and 20 grains daily but were frequently observed for untoward symptoms Where this drug is employed close co operation with the medical department is to be advised Levy Holder and Bullowa[8] used the drug on many cases but they found it hypertoxic after prolonged use These authors advocated the use of sulfanilyl sulfanilate as an effective antiviral remedy In the treatment of lymphogranulomatous rectal strictures, the drug, administered for 3 or 4 weeks, resulted in striking improvements Rectal dilatation of the strictures was necessary in but 4 instances, as against 150 in a prior series where the medication was omitted Fraser Kane and Parks[18] advised the administration of fuadin intramuscularly and tartar emetic intravenously in treatment of these strictures Woods and Hanlon[137] found that the sulfonamides affected strictures only indirectly, but that they were useful in incipient anorectal involvements

Estrogens have been advocated in treat

ment, their use being predicated on the fact that several cases of pregnancy with concurrent stricture were resolved during the puerperium.[107] One case became symptom free in 2 months' time under hydroxyphenylhexane, 18 mg daily. Potassium and sodium tartrate have been administered intravenously with good results.[71] Frei antigen has been used, but the results were unsatisfactory.[8] In another series no change was noted by the authors. It has been administered both subcutaneously and intravenously.[110] Carmel[71] noted a decided improvement in the general well being of his patients under this form of therapy with a marked increase in appetite, gain in weight and a diminution in the discharge of pus and blood from the rectum. At the site of the stricture the tissues became much softer, but this change was not sufficient to warrant hope for cure by the use of this method alone.

DILATATION. The purpose of this procedure is to dilate or stretch the stricture. It is used exclusively for the annular type if within reach of the finger. The best method is to insert the gloved little finger at daily intervals or even thrice weekly. Metal dilators (Hegar's) or soft rubber bougies may be employed, beginning with the smallest and gradually increasing the size. Treatments are administered thrice weekly. In each and every instance extreme caution should attend the introduction of any dilator, since rupture of the wall may occur from undue force. Strictures of this type may be dilated through a proctoscope, but other procedures are much more desirable.

Pearce, Bower and Burns[111] used this procedure on a lymphogranulomatous stricture. The patient subsequently died as the result of a fatal peritonitis from a proctosalpingostomic fistula complicating the lymphogranuloma venereum.

Ten cases in a series of 192 with inflammatory rectal strictures were subjected to dilatation by Woods and Hanlon.[137] The procedure was employed both alone and in conjunction with drugs and surgery. Alone it failed to be conspicuously successful, being not without danger. The authors quoted Warthin as advocating sigmoidostomy with simultaneous obliteration of the cul de sac in order to obviate danger of perforation during the procedure. Wright, Berg, Bolden and Freeman[139] report a case of vaginal stricture, rectovaginal fistula and rectal stricture of lymphogranulomatous origin. Colostomy had been refused, and the patient subsequently died from ascending urinary infection.

DIATHERMY. The theory upon which this procedure is employed is that scar tissue is revitalized by heat, thus rendering the hard, inelastic tissues softer and more pliable. Its application is practically limited to anal stenoses and postoperative constrictions.

Technic. An electrode (Hegar's bougie) is passed into the stricture so that it fits snugly. Two other electrodes (aluminum discs) are applied, one to the lumbar region, the other to the abdomen. Heat is then applied for from 10 to 20 minutes at 45 degrees C. thrice weekly for from four to six weeks. Improvement has been noted in some cases.[36, 77, 111]

Advantages and Disadvantages. No anesthesia is required, the danger is minimal and no pain is experienced by its use. The method, however, is helpful only in cases of anal stenoses and incipient stricture formation within reach of the finger. Moreover, the apparatus is expensive and cumbersome. In our experience results to say the least were discouraging. Shackelford and Weinberg[123] concurred in this and stated that diathermy *per se* applied to rectal strictures of lymphogranulomatous origin offered very little if any curative effects and that the benefits which did accrue were due primarily to the results of more frequent and prolonged dilatations that had been used by them in the past. Woods and Hanlon[137] postulated that contradictory reports had been received concerning this form of therapy even in the incipient anorectal phases. Following fibrous stricture formation it signally failed to benefit the condition, and any improvement that did result was attributed by them to the purely mechanical dilating effect of

rectal instrumentation Conversely, Martz and Foote[101] felt strongly that these strictures treated by diathermy did improve and offered as a basis 13 cases so treated Four were improved following a few treatments but left prior to the completion of treatment The balance of them were carried eventually to complete, or almost complete cure of the strictured area All of these latter cases permitted the insertion of a 25 or 26 mm dilator or they attained a size comparable to a normal diameter of approximately 2½ cm Three had had colostomies done prior to treatment for obstructive symptoms In these, the colostomy was eventually closed and the patients had natural normal evacuations without recourse to catharsis

Electrolysis Due to the fact that the negative pole of a galvanic battery has the power to soften tissues, circular negative electrolysis has been employed in treating rectal stricture The technic is simple differing among various workers only in regard to current strength duration and the frequency of application Ordinarily a current of from 5 to 25 milliamperes is used over a period of from 5 to 15 minutes once or twice weekly Although a prickling sensation is invariably experienced, no actual pain should attend the procedure Favorable results have been reported from its use in but few instances

Carbon Dioxide Snow The intention implied here is to change the firm fibrotic stricture to a softer and yielding consistency by causing distention of its cells with the subsequent liberation of a serous exudate[3-33, 34, 3] Mentzer and Allen[103] used this snow contained in hollow metal, cervical dilators for 90 seconds The results attained were disappointing, and the procedure was abandoned

Surgical Procedures Radical surgical excision is the procedure of choice for inflammatory strictures of the rectum but since it is intended that this volume should serve as a source of reference these occasionally performed procedures will be described

Rectotomy Stricturotomy *Internal Rectotomy* This procedure may be performed for strictures within reach of the finger, especially the annular types

Technic With the patient under anesthesia and preferably in the lithotomy position, the stricture is incised with a blunt pointed bistoury, the finger being used as a guide, or, better, through a proctoscope under direct vision A straight, single incision is made through the stricture in the midline posteriorly for a depth of approximately ¼ inch The endotherm may be substituted for the scalpel in order to avoid bleeding, which usually is marked and difficult to control A small rubber tube surrounded by petroleum jelly gauze is then introduced through the stricture and permitted to remain in place for 48 hours Subsequent finger dilatation should be encouraged

Comment The author employed this procedure many times in the past and his experience was that subsequent contracture always resulted

External Rectotomy This procedure which may be utilized for strictures that are short, narrow, and situated above the anus and below the peritoneal reflection consists of longitudinal incision and suture of the stricture through a posterior approach

Technic With the patient in the left lateral position semiprone, a posterior midline incision is made from the coccyx to a point within one inch of the anus In some cases it may be necessary to remove the coccyx and lower segments of the sacrum, if the constriction is located at a high level and difficulty is encountered The retrorectal tissues are divided and retracted to expose the rectum A metal sound of sufficiently small caliber to be admitted through the stricture is introduced from below by an assistant A posterior incision is now carried through the rectum longitudinally and the stricture divided The sound is withdrawn and a rubber catheter surrounded by petroleum jelly gauze is introduced through the strictured area The

rectum is sutured with chromic gut and the continuity of the superficial structures, except where several strips of iodoform gauze are inserted, is restored

Unfortunately this method has not over the line of suture The skin is closed except where a small drain is placed in the upper portion of the wound Postoperatively, the drain is removed in 24 hours and the rectal tube at the end of four days

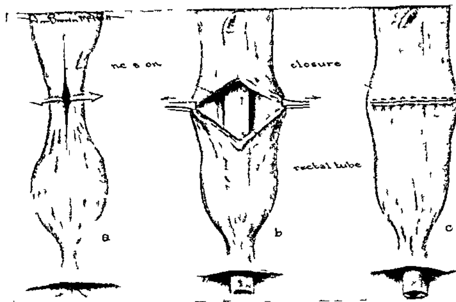


Fig 291 Lockhart Mummery and Lloyd Davies operation (a) Longitudinal incision through posterior rectal wall (b) Rubber tube inserted into rectum and edges of wound retracted laterally (c) Wound is sutured transversely

proved satisfactory since subsequent contracture occurs even with dilatation Of two cases in which this procedure was performed by the author fistulae occurred and the subsequent contraction was more marked than prior to the operation

Lockhart Mummery and Lloyd Davies[8] describe a method which differs from the foregoing in that after the postrectal fascia is divided and the rectum stripped from the pelvic wall on each side so as to bring it into the wound the stricture is divided longitudinally into the rectum with the incision extending to the healthy bowel above and below the narrowed portion (Fig 291) The edges of the rectum are drawn apart so as to form a transverse wound instead of a longitudinal one The transverse wound is then closed by interrupted catgut sutures with the knots on the mucous side and covered by a second line of Lembert sutures following which the fascia is stitched

Comment This method is unique and merits mention due to its simplicity The procedure however, is comparatively new and has been employed in but few instances Therefore, further trial must determine its practicability

Perirectal Denudation (Jelks)[70] The procedure as outlined by this author is indicated for strictures located above the anus and below the peritoneal reflection which are due to residual and transudative infection in and about the rectal wall Especially in the gonorrheal type Jelks cautioned against operative intervention except in the quiescent stage

Ulcerations should be treated before and after operation by irrigations and topical applications as enumerated under medicinal treatment

Technic With the patient under anesthesia and in the exaggerated lithotomy position, an anteroposterior incision 1½

inches in length is made on each side of the anus just beyond the outer margin of the fibers of the external sphincter muscle, and carried to the inferior, or undersurface, of the levator ani A closed hemostat is then pushed through this muscle and opened With the finger in the rectum as a guide, a scalpel is introduced through this opening and the hard, fibrous, perirectal tissues are severed up to and just beyond the upper border of the stricture for some distance around the lateral walls of the rectum As the scalpel is advanced, it should be directed slightly downward toward the gut, but at no time should perforation of the wall occur The operation is completed by a posterior stricturotomy, after which petroleum jelly gauze is inserted into the rectum and iodoform packing into each lateral incision up to the roof for the purpose of drainage All drains are removed at the end of 48 hours

COLOSTOMY The purpose of colostomy is to divert the fecal passage, thereby permitting rest of the diseased area It is indicated in varying degrees of obstruction and in some instances as a preliminary to extirpation Colostomy does diminish suffering by functional rest It lessens toxicity and increases the general resistance of the patient Either a temporary or a permanent colostomy may be performed These are discussed in detail in Chapter 20 (Colostomy) page 857

Technic A small abdominal incision is made from a point one and one half inches above and lateral to the spine of the pubis and carried upward and lateral until it is on a line with and mesial to the left antero superior iliac spine Bleeding points are controlled The fibers of each muscle layer are separated rather than incised and retracted The exposed peritoneum is nicked with a scalpel and enlarged by means of scissors, after which the hooked finger is passed beneath the sigmoid (noted by its longitudinal bands, sacculations and appendices epiploicae) and brought through the wound Enough of the gut is withdrawn to expose the mesocolon With a curved hemostat the mesocolon is pierced one half inch below the bowel and a glass rod of sufficient length to rest on each side of the edges of the wound is inserted Ordinarily, one or two sutures of No 0 chromic catgut are used to close the peritoneum at each end, a guiding factor is the ability to introduce one finger snugly at each end of the bowel The aponeurosis is sutured layer by layer using No 30 steel alloy wire and the skin edges are approximated with No 35 steel alloy wire Finally, petroleum jelly gauze is placed around the protruding bowel and beneath the glass rod Mineral oil dressings are applied and reinforced by binder Between the second and third post operative days, the bowel is divided transversely and irrigation of the lower loop instituted daily thereafter

Subsequently, a perineal excision may be performed It is simple and the mortality is low An abdominoperineal excision in one stage however, is a formidable procedure and carries with it a mortality much higher than for malignant growths

RECTOSIGMOIDOSTOMY In 1899, J B Bacon[9 71] first presented his method of short circuiting the fecal stream by anastomosis of the sigmoid above with the gut below the stricture, using a Murphy button By means of a more recently devised instrument[10] the adjacent rectal and sigmoidal walls are inverted into the rectum over a metal instrument and caught by a tight rubber ring, so that by pressure necrosis a permanent orifice is created between rectum and sigmoid The advantage of this procedure is that this instrument permits complete anastomosis without opening either the rectum or sigmoid However the fact that this method has never gained popularity is a reliable indication that it is not practical

PERINEAL EXCISION WITH PERMANENT COLOSTOMY No one operation is applicable to all varieties of stricture of the rectum, but in the majority of cases a permanent colostomy with later excision of the rectum by the perineal route is the procedure of choice The method recommends itself be

cause the procedure is not so formidable as are the various abdominoperineal operations which carry an operative mortality far greater than that encountered in extirpation for malignancy

Right angle clamps are applied above the constriction, and the rectum is divided by cautery The strictured bowel is removed from the operative field and the remaining stump closed with No 1 chromic catgut

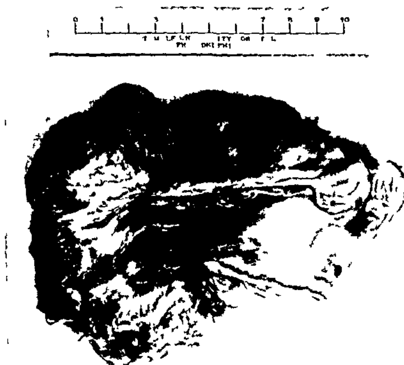


Fig 292 L D Extensive stricture of rectum removed by colostomy and perineal excision

Technic As a preliminary step, a permanent left inguinal colostomy is established and after the bowel has been divided which is usually the second day, the lower loop is irrigated daily thereafter until the perineal excision is performed usually from three to six weeks later

Second Stage With the patient in the inverted or lithotomy position the anus is closed with a purse string suture of linen and an incision made in the posterior mid line from a point immediately above the coccyx down to and around the anus The incision is deepened and the underlying fascia and levator ani muscles are divided *By drawing the anus backward the rectum* is dissected from the prostate or vagina The dissection is continued upward until the bowel is completely mobilized to a point well above the upper limit of the stricture

A large sheet of rubber dam is placed in the wound and gently packed with strips of plain gauze

The procedure of perineal excision with permanent colostomy was advocated and performed by Barber and Murphy[20] on 35 cases out of a series of 55 reviewed by them Various amounts of sigmoid colon were included in the procedure The Mikulicz operation was done on 3 and permanent abdominal anus was formed on 28 and the sacroperineal type on 4 It was realized by the authors that it was impossible to determine the degree of sigmoid involvement without celiotomy so to avoid subsequent colostomies at a higher plane all subsequent cases were celiotomized The permanent abdominal anus was formed on those cases in the advanced stages of the disease The authors were of the opinion

that posterior resection above the anal sphincter was unwise, as the firm, cartilage like cicatrix formed following terminal anastomosis was, in their experience, just about as troublesome as the original stricture Also, denervation of the sphincter seemed to further interfere with satisfactory function Morris[101] did a successful abdominoperineal resection for rectal inflammatory stricture removing the distal three inches of the strictured proximal stoma with concurrent repair of a regional hernia and formation of a new stoma Three months later the distal stoma in the sigmoid was freed, the rectum and sigmoid mobilized from above and the operation completed by perineal removal, the abdominal wound healing per primam and the perineal wound by granulation within 6 weeks

Woods and Hanlon's cases[137] received colostomies in the advanced stages of rectal lymphogranuloma with no constant success resulting in abating the disease, radical resection of the rectosigmoid was performed on the infected cases Perianal resection of the rectosigmoid following colostomy was reported by them as having been done by Bacon Barber and Murphy,* and Edwards and Kindell[44] Two of these series included instances of protracted perineal infection Perineal resection was the first method used but existing difficulties led to the adoption of the combined abdominoperineal resection One case had had a loop colostomy done two months previously, prior to a combined abdominoperineal resection The authors found the relationship of persistent perineal infection to incomplete resection of the diseased rectosigmoid to be pertinently significant They were also of the opinion that the blind loop of rectosigmoid, distal to a colostomy in perineal resection, may subsequently harbor active infection leading to an unhealed perineal wound or to persistent discharge from the colostomy

In one of their cases, a resection of this blind loop gave complete symptomatic relief Edwards and Kindell s five cases[44] were done by the use of a preliminary laparotomy loop colostomy followed by perineal excision, done by the Lockhart Mummery method All five of them survived, showing decided general improvement

RESECTION *Intrasphincteric* The method here outlined by Hartman [7] may be employed in constrictions of the lower and middle portions of the rectum and consists of excising the strictured area through the anus

Technic Following divulsion of the anus a circular incision is made around the anorectal line in a manner similar to that used in the obsolete Whitehead operation The incision is carried deeply so as to free the rectum entirely at this point The rectal stump thus formed is held taut with hemostats and the dissection continued until the rectum is mobilized This freed rectum, in which the stricture is contained, is brought down, excised with the cautery and sutured to the anus It is important that the upper segment present normal mucous membrane for anastomosis with the anal canal For drainage, iodoform wicks are inserted into the ischiorectal fossae through stab wounds Although the disadvantages of this procedure are many, excellent results have been reported [93]

The late Pauchet[110] modified this one stage into a three stage procedure consisting of (1) the establishment of a temporary left inguinal colostomy (2) intrasphincteric mobilization of the rectum pulling down the bowel proximal to the stricture and suturing it to the skin edges, and (3) closure of the colostomy Wright and his co workers[138] instituted this technic in 26 instances with two deaths, another occurring later Certain phases of this procedure possess merit, but many years of experience have shown us that a short period must be allowed for retraction of the cut edge of bowel therefore, any immediate attempt to suture the mobilized gut to the anus is to be discouraged Benitez and Lopez have discussed their preference for surgical procedures with preservation of the sphincter muscles It is their opinion that "the avoidance of peritonealization of raw



Fig 293 H G (colored) Specimen shows extensive stricture of rectum Patient discharged as a domestic because of colostomy The distal bowel was resected and colostomy transplanted to anus *Normal sphincter mechanism*

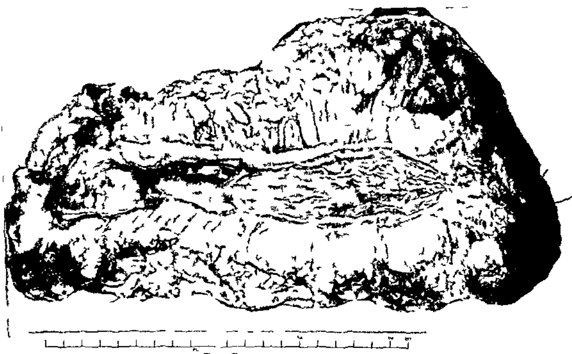


Fig 294 F R age 41 superintendent of hospital Extensive inflammatory *stricture of* rectum previously diagnosed malignant Colostomy established in 1937, after which position was jeopardized and marriage postponed Proctosigmoidectomy performed with re establishment of bowel continuity sphincter muscles retained normal sphincter function

areas and formation of a new pelvic floor abdominal wound closure with through and through sutures transanal approach with sphincter preservation thus establishing a more physiologically artificial anus than that offered by abdominal colostomy and radical removal of the diseased tissue compatible with physiologic function and patient rehabilitation are distinct advantages over other procedures '

Sacral Excision Originally employed for malignant growths this method of Kraske [6] has been described for high lying strictures

Technic The anus is closed with a purse string suture and an incision made from the

anus to the sacrum The underlying tissues are dissected free and retracted, after which *the coccyx and lower segments of the* sacrum are removed up to but not including the third posterior sacral foramen The strictured bowel is mobilized, excised and the upper free segment drawn down and joined to the proximal or lower stump Occasionally it may be desirable to bring the upper segment through the anal aperture and suture it to the anus after denudation of its skin lining If it is necessary to *open the peritoneum the procedure may be* accomplished without soiling, since the rectum is not opened until the bowel is brought down into the wound and the peritoneum closed Two cases performed by this method were reported by Ewell and Jackson[40] In the first, the procedure followed the formation of a permanent colostomy two months after the initial operation The strictured area was found surrounded by dense adhesions, the lumen being almost entirely obliterated The second case was done 19 months following a colostomy The patient made a good recovery except for an annoying discharge from the lower colostomy opening Four months later the remnant of the lower segment of bowel was removed *Six months later she was delivered of a viable fetus by caesarean section*

Perineal Proctosigmoidectomy and Abdominoperineal Proctosigmoidectomy This may be ideally selected in certain cases of inflammatory stricture of the rectum The technic is discussed under Malignancy, Chapter 19, Part 3, *page 746* while our comments pertinent to this type of procedure are appended in the following summary

Summary

At the Graduate Hospital especially, where several hundred patients with various *manifestations* of lymphogranuloma venereum came under our observation we were able to segregate cases of inflammatory stricture of the rectum into groups, for specific types of treatment *For example* one group of 40 cases was given fuadin in another comprising 16, antimony salts were employed, dilute hydrochloric acid was injected into 6, while in an equal number *chaulmoogra* oil was used, all with no noticeable improvement Dmelcos and autogenous vaccines were also utilized Over a period, Frei antigen was injected subcutaneously, intramuscularly and, in some few instances, intravenously

Both Martin[91, 99] and the author[11, 17] were somewhat enthusiastic over the results obtained, but time disclosed no effect visible on the degree of stricture formation Dr *Jules Werner in our clinic became interested* in carbon dioxide snow, whereupon a group of cases were apportioned to him for treatment Subsequently, Werner discarded the method as "of no value" Adjacent to our clinic was the department of physiotherapy so that ample opportunity for close cooperation was afforded *Diathermy* was employed, but, here too, the final results were unsatisfactory The operation devised by Jelks,[0] namely, perirectal denudation, was practiced by various members of our clinic, and in 1934 the author[19] reported on 24 of 60 cases, commenting quite foolishly that the procedure may obviate resection in selected cases but advising prolonged observation and periodic dilatation In the *ensuing period all of these patients returned to their former status of contracture* for which reason the maneuver was discontinued Other forms of surgical treatment were instituted, such as rectotomy, but each became designated as an experimental failure About this time one of the services became interested in this problem and instituted an abdominoperineal excision of the Miles type The morbidity was low because few patients survived the one stage procedure The mortality *averaged about* 70 per cent This of course, was prior to the era of sulfonamide therapy and antibiotics or careful pre and postoperative treatment Feeling that a two stage procedure was preferable we attempted a two stage Lahey type of excision, but here, too, *even with interval irrigation the mortality* rate was high following the second stage (*26* per cent) As in our cases of rectal

malignancy, this procedure has been almost abandoned because of inequality of the two stages and the formidability of the second stage The patients in whom an inguinal colostomy was performed progressed well, in that increased weight and improvement of appetite was experienced By daily irrigation of the distal loop, the irritating discharges tenesmus and leakage were diminished Certain sequelae such as prolapse or retraction of the colostomy but especially contraction of the surrounding skin (keloid in character which Rosser[117, 118] refers to as fibroplastic diathesis'), were noted An appreciable number of these colostomized patients did not return to the clinic for resection In 51 patients, 24 of whom have been previously reported[1, 16] colostomy with interval irrigation of the distal loop followed by perineal excision (Lockhart Mummery) was performed, with one death (1 9% mortality rate) During the past few years, we have performed proctosigmoidectomy by the abdominoperineal route without colostomy and with preservation of the sphincter musculature and while there has been no death in 25 patients on whom proctosigmoidectomy' was performed and though the final results have been extremely satisfactory the morbidity and prolonged hospital convalescence have altered our approach to the problem At present all patients with inflammatory stricture of the rectum are subjected to radical surgical extirpation which for the purpose of clarity may be described under the headings A and 'B'

A For all strictures of the rectum without acute or subacute pararectal and/or para anal abscess and fistula without esthiomene of the anus and without destruction or extensive infiltration of the anal canal and sphincter musculature by the disease process, the following procedure in three stages is recommended

1 Transversostomy, double barrelled with separate loops similar to the Wangensteen method[134]

Interval irrigation of the distal loop and rectum with nonabsorbable sulfasuxidine in suspension form four times daily Following this regimen for one month should come proctosigmoidectomy

2 Abdominoperineal proctosigmoidectomy with preservation of the sphincter muscles (See Malignancy Chap 19, p 737)

Irrigations similar to the above are administered through the distal transversostomy loop Usually these patients are out of bed on the fifth and ready for discharge on the eleventh postoperative day, but, since prolonged defunctioning tends to permit contraction of the skin of the anal canal with the sigmoidal mucosa, not more than three weeks should elapse before the next and final step is accomplished

3 Closure of the transversostomy, usually by extraperitoneal technic

Rectovaginal fistula is not a contraindication to proctosigmoidectomy since the posterior vaginal wall can be readily excised and approximated without impairment of function In fact a procedure which the writer has found satisfactory both in recto vaginal and recto urethral fistulae is to perform proctosigmoidectomy with partial excision of the vaginal wall containing the fistula in the female, or proctosigmoidectomy with closure of the urethral fistula in the male (see Fistula Chap 7 p 195)

B For all inflammatory rectal strictures with acute or subacute pararectal abscess and fistula (acute abscesses are first drained) with perianal abscess and fistula with anal and anoperineal esthiomene and with destruction and extensive infiltration of the anal canal and sphincter musculature the following procedure in two stages is recommended

1 Colostomy (double barrelled sigmoidostomy) with separated loops

Interval irrigation of distal loop and rectum with sulfasuxidine in suspension four times a day, following this regimen for one month

2 Perineal excision without closure of the wound

The 'B' technic is the classical Lockhart Mummery method, termed in this country colostomy and posterior excision" (see

Chap 19, Malignancy) In all cases, whether "A" or "B," the use of absorbable sulfonamide (sulfathiazole) therapy is instituted (see pre and postoperative treatment) more recently, penicillin has been used Because of the cost of streptomycin, only a few cases of inflammatory stricture have been treated therewith so far

ESTHIOMENE

Esthiomenic processes involving the perianal and anal epithelium are best corrected by combined sulfonamide therapy and local excision, preferably using the surgical diathermy Where extensive destruction of the anal canal has occurred, colostomy and posterior excision are advocated

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anus have resulted in a similar condition

PATHOLOGY

So far as the pathology of anal stenosis is concerned, it has been our privilege to section a number of these, and all of them presented practically the same picture The constriction was composed of fibrous connective tissue Trabeculations were seen extending between the superficial fibers of the external sphincter but in each instance the involvement was variable

SYMPTOMS

A history of some previous infection or operation is usually mentioned by the patient Progressive efforts at straining with attendant discomfort, feeling of pressure and incompleteness of evacuation are constant symptoms Consumption of laxatives obviously results in numerous movements With concurrent dribbling irritation of the skin and parietes are not uncommon As a result of ineffectual straining fissure formation is frequently present, the discomfort assuming the character of a sharp excruciating type of pain With stenosis of the anal canal, ribbon shaped stools are often mentioned by the patient

DIAGNOSIS

The diagnosis is made on the history of some previous affection and by digital examination which upon insertion of the lubricated finger shows an abnormal narrowing of the anal canal If the stenosis will admit the finger it will be felt as a tense fibrous shelf annular or ringlike and usually located at, or slightly below the anorectal line

TREATMENT

Preventive In each case care should be taken not to remove too much anal skin at the time of operation In performing a hemorrhoidectomy, stenosis may be avoided by leaving an island of anal skin between each pile mass removed Compresses wrung out in either hot saline or boric acid solution and hot sitz baths will prevent an accumulation of the inflammatory exudate *The occasional insertion of the lubricated* finger following operation avoids too early healing of the wound In resection of the rectum when the proximal segment is anastomosed to the anal canal, delayed suture should be practiced, since stenosis will frequently result otherwise

Surgical In discussing the treatment of acquired anal stenosis the author introspectively looks backward with a feeling akin to sadness to a period fraught with repeated failures by various methods employed at that time for alleviation such as periodic dilatation divulsion, carbon dioxide snow and proctotomy

During the summer of 1943 Dr E G Martin of Detroit visited our clinic and as fortune would have it observed the writer attempt correction of a constricted anal aperture In a courteously helpful fashion he directed the procedure according to a principle which he described in 1919[8] which was later presented in detail before the American Proctologic Society in 1944[9]

TABLE 26 DIFFERENTIAL DIAGNOSIS

	STRICTURE	STENOSIS
History	Infection	Previous operation (exclusive of congenital)
Race	Mostly in colored	Equal
Age	20-40	Any age
Location	Rectum or sigmoid	Anus
Type	Tubular or annular	Annular
Ulceration	Practically always present	Infrequent
Involvement	Mucous membrane submucosa and muscular coat as well as perirectal tissues	Modified anal skin

CHAPTER 12—PART 2

Stenosis of the Anal Canal

DEFINITION

Anal stenosis is an abnormal narrowing of the lumen of the anal canal due to contraction of the lining skin, which, either in part or in its entirety has been replaced by fibrous connective tissue It usually is located at the anorectal line but may occur in any portion of the canal between the above junction and the margin

ETIOLOGY

The causes of anal stenosis are considered under the headings Congenital and Acquired

Congenital Stenosis

This anomaly is rather infrequent and includes only contractures at and below the anorectal line Occlusion of the anus may be due to failure of the anal plate to be absorbed or to the presence of a fibrous membrane about the margin of the anus From the discussion on embryology, it will be recalled that the anal plate or anorectal membrane represents the site of fusion between the endodermal cloaca (hindgut) and the proctodeum so that faulty union of these two structures or incomplete absorption of the anal plate may result in stenosis

This constriction, which usually occurs at the anorectal line, may assume any form from a slight ringlike narrowing to an atresia of the entire length of the anus The former which is often spoken of as diaphragmatic, has its opening in the center, whereas in the crescentic variety the aperture is located to one side For further discussion of congenital stenosis, the reader is referred to Malformations, Chapter 3

Acquired Stenosis

If it is kept in mind that the anus is but a small, slitlike aperture surrounded by groups of muscle fibers, circularly arranged, which normally are in a state of tonic contraction, it will not be difficult to understand how any process which denudes the lining epithelium can be followed by contraction of the scar tissue thus formed Various inflammatory conditions of the anus and lower rectum may be followed by stenosis in this site but in almost every case there is some sizable breech in the continuity of the skin with infection superimposed Where excision of the anal skin is extensive, as in the Whitehead operation[11] for hemorrhoids, anal stenosis is not uncommon, so that for this reason alone, the procedure is seldom employed Even with the usual methods of removing external hemorrhoids narrowing may occur where too much anal skin is removed where an island of skin is not left between each pile mass excised, where much suturing has been done or where the clamp is applied transversely rather than in the longitudinal axis of the bowel Excision of the rectum with suture of the proximal segment to the anal canal is frequently followed by constriction at the line of the anastomosis Infrequently, the excision of fistulae and condylomatous lesions is complicated by narrowing of the canal, but here the constriction is usually crescentic or shelflike The injection of chemicals into the anal skin, either for external hemorrhoids or pruritus frequently causes a slough which may be followed by stenosis Injuries to the

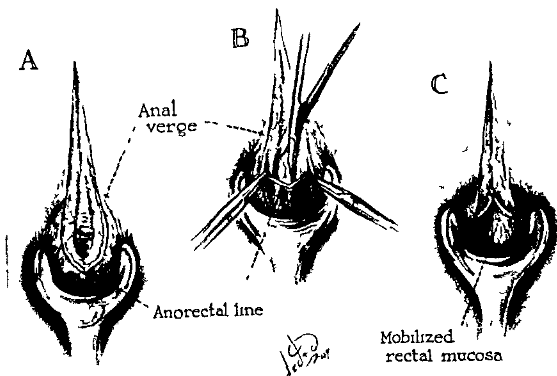


Fig 295 In this particular case the stenosis is present in the posterior phase (A) An incision is carried in the skin from the point below the tip of the coccyx and carried through the stenotic ring as far as the anorectal line thus gapping results The edge of the mucous membrane is therefore separated from the underlying tissue with blunt scissors and loosened so that as shown in (B) it may be tacked with fine catgut suture interruptedly placed as disclosed in (C)

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Based on the original investigations of Degouy,[3] Couty,[2] Lannelongue[7] and Vauclaire,[10] Martin has offered a contribution for which those doing anorectal surgery shall forever be grateful The procedure is described below

Technic of Anoplasty It is assumed that the patient has been shaved and prepared by cleansing enemata The jackknife position is employed with the patient under regional analgesia—intradural or trans sacral

The skin is prepared and the degree of contracture ascertained Gently, a Smith or Hill Ferguson retracting speculum is introduced A single, straight incision is carried in the skin from a point slightly below the coccyx tip and carried forward through the constriction to the anorectal (pectinate) line or to its junction with normal mucous membrane In depth, the incision should be made through the skin and subcutaneous tissue to but not through, the underlying musculature A gaping wound is now presented The edges of the normal rectal mucosa are grasped (about ¾ inch) with mosquito hemostats and gently separated from the attachments by curved, blunt, Mayo scissors

Without tearing, the mucosa is elevated for a distance of approximately one half inch and tacked interruptedly to the subcutaneous tissue (*not muscle*) at the margin No 0 or 00 chromic catgut is used In brief, the stenotic ring is divided in the posterior quadrant, leaving a small but gaping wound The mucosa alone is freed, pulled down and tacked to the subcutaneous tissue at a level with the anal margin The approximate distance involved in pulling down the mucosa is one half inch The approximate distance the mucosa is separated from side to side is three quarters of an inch on the average

COMMENT During World War II, innumerable patients with varying degrees of anal stenoses which had occurred following fissurectomy or *hemorrhoidectomy*, especially when the Whitehead procedure had been used, were referred to our department for surgical correction of the condition Thus there was made available an unusual opportunity to employ and evaluate this procedure While there has been no preservation of accurate records of the number of patients on whom this operation was performed, a conservative estimate would place it at 200 patients from the summer of 1943 up to and including the present time With the exception of three instances in which a 'wet' anus had occurred (in the early days of the usage of the procedure) which was due to tacking the mucosa too far caudad, there has not been a single instance where the patient was not definitely benefited by use of this method For the results achieved we feel deeply grateful to Dr Martin

Mention should be made of the "Tunnel Skin Graft" advocated by Keller, [6] with which we have had insufficient experience to warrant worthwhile conclusions

Technic The stenosis is exposed by means of an ordinary speculum, and a trocar and cannula are inserted through the wall of the stricture, following which the trocar is withdrawn A U shaped carrier is passed into the lumen of the stricture and its short arm pressed into the distal end of the cannula, the latter is then removed A full thickness tubular or flat skin graft is threaded on the tip of the presenting short arm with a black silk ligature The U carrier is removed gently and the silk ligature carefully pulled until the skin graft is inserted to its full length The ends of the ligature are then tied Three or four similar skin grafts inserted at equidistant points around the circumference complete the procedure In order to obtain accurate approximation of the grafts throughout the area to be epithelialized, the use of a Hagner or Pilcher bag may be employed The postoperative treatment consists of constipating the bowels for seven days at the end of which time the bag is removed It is reinserted for another seven days, after which the rectum is cleansed with lysol solution and the grafts are divided With some, this method has proved of value [1, 4]

CHAPTER 13

Venereal Disease of Anus and Rectum

GONORRHEA

Gonorrhea of the rectum or gonorrheal proctitis, is not of infrequent occurrence although many reports have been offered to the contrary With the exception of a few writers[38, 90] the literature on the subject in this country is comparatively sparse On the Continent however, many references are made to gonorrhea of the rectum[84]

Pugh[84] found a paucity existing in the literature of gonorrheal proctitis, in proportion to the importance and frequency of the entity and reported the incidence of a mild epidemic in a penal institution He explained that this scarcity in the literature was due to rectal drainage being ample in many cases so that the infection tended to clear up rapidly In the presence of a tight anal orifice however the disease may be prolonged in some cases ascending to involve the sigmoid

Randall and Jackman[86] also report infrequent mention of the entity

Various statistics show that the infection is more prevalent in women than in men[6, 8, 84, 86, 110] Pugh[84] noted a predominance of proctitis in his female patients reporting a figure of 30 per cent In males those seen at clinics were reported as 8 per cent with a contrasting 2 per cent in private practice Randall and Jackman[86] are of the opinion that among women having Neisserian infection involving the genital tract gonorrheal proctitis is not uncommon As to age those who have observed these cases in great numbers report the largest occurrence between 16 and 30 years[86] although it is also encountered in children and sometimes in infants[86] In our 17 cases the incidence was much greater in the colored race by a ratio of 4 to 1

Etiology

The specific cause is the gonococcus of Neisser, which gains entrance by (1) direct inoculation of the mucous membrane by vaginal or urethral discharge laden with the organisms (2) coitus via rectum (pederasty) (3) contamination during rectal examination and in children especially when hospitalized by the insertion of thermometers enema tips and syringes[1, 84, 86, 110]

In 5 cases reported by Pugh[84] gonorrheal proctitis resulted following use of a

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In 5 cases reported by Pugh,[84] gonorrheal proctitis resulted following use of a

fountain syringe tip in one and an original vaginitis in another, both females In males, one resulted from using a "pile dilator" belonging to another person Another contracted the infection from forced anal coitus while under the influence of liquor The fifth case a female child, aged 3 weeks, was hospitalized for a foul smelling rectal discharge smears and cultures were positive for gonorrhea On subsequent examination of the mother, she was found to be infected The author concluded that infection was incurred during the child s passage through the birth canal

Pathology

Usually only the lower three inches of the rectum are involved,[57, 56] although the inflammatory process may extend upward to the sigmoid colon[1, 81] The anal canal is rarely contaminated due to its lining of stratified squamous epithelium which is of greater resistance than the membranes lining the rectum and crypts It was not uncommon for the author to find gonorrheal infection directly referable to the rectum, since the nature of the infection frequently is overlooked[8] Ordinarily the mucosa is acutely inflamed edematous and dark red in color yet in some cases only slight congestion may be noted Smeared over the surface of the mucous membrane is a thick creamy pus possessing a pungent odor Where the gonococci extend into the submucosa, small erosions are not uncommon Should the process become chronic, which occurs in neglected cases ulceration, scarring and polypoid excrescences or mammillations appear[108] Although it is our feeling that rectal stricture rarely is caused by the Neisserian gonococcus which contention is supported by the investigation of such workers as Baer[6] and Joachimovits[49] stricture may occur as a result of the chronic productive exudate with the deposition of fibrous tissue in the various layers of the rectum It should be understood that in every case of organic stricture, infiltration of fibrous tissue occurs outside the rectum as well as in and between the various coats Such may be readily demonstrated by macroscopic and microscopic section

It is generally conceded that gonorrhea of the anus rarely occurs[11, 74, 1] Jones and Janis[40] report an exceptional instance of gonorrheal proctitis and chancre occurring simultaneously in the same patient, but the literature has failed to record a duplication of this double involvement This area is lined with stratified squamous epithelium and therefore is more resistant, although the seepage of pus over the anal surfaces does occasionally cause excoriation[8] Convincing evidence has been offered by Rosser[40] that the anal crypts serve as reservoirs of infection, as shown by the drainage of free pus from their mouths

Symptoms

Pain, which is accentuated by defecation is a common feature and is usually of a burning or smarting character[86] A frequent desire for stool unrelieved by evacuation, fullness and tenesmus are common complaints The patient often complains of discharge and local irritation from seepage through the anal orifice The discharge is profuse and milky, at times streaked with blood, and has a foul smelling odor[81] As the pus oozes and seeps through the anal aperture, the skin becomes excoriated and fissured so that the patient experiences additional discomfort In a well defined case constitutional reaction as manifested by rise in temperature rapid pulse and general malaise is observed after a few days

Diagnosis

Concomitant circumstances or the history may suggest the presence of a neisserian infection, especially when pederasty[40] or the presence of a vaginal or urethral discharge is mentioned[40] In some instances the nurse will disclose that there is an epidemic in the pediatric ward of the hospital Usually the adult patient will deny perversion or will maliciously mislead the physician in his

interpretation of symptoms, so that in each case a positive diagnosis must be determined by means of the microscope

Upon insertion of the finger the mucosa feels hot tender and swollen, while through the proctoscope it appears acutely inflamed and tumefied with scattered areas of erosions A positive diagnosis is made by smears of the pus taken directly from the rectal mucous membrane through a proctoscope Pus in the stools and that escaping from the anal orifice is unsatisfactory for examination because of the presence of other cocci For accuracy the Gram differential stain (iodine and potassium iodide) should always be employed in preference to methylene blue The gonococci are gram negative and may be identified by their coffee bean or ovoid shape their intracellular position and their appearance in clusters The technic using four different solutions as outlined by Pelouze[91] has proved most reliable For staining technic see Chapter 2 Examination and Diagnosis p 67

Differential Diagnosis

Gonorrhea of the rectum is to be differentiated from various other diseases such as syphilitic amebic bacillary and chronic ulcerative proctosigmoiditis for which the reader is referred to page 282

Complications

Among the sequelae and complications of gonorrheal proctitis may be mentioned extensive ulceration abscess[88] fistulae[75] fissure[75] condylomata acuminata and pruritus together with those of more serious import such as stricture[19, 39, 48, 9, 99, 108, 114] complicated fistulae and arthritis[79] Arenas and Roganti report a rare and unusual complication due to gonorrhea an evolution of pyosalpinx opening into the abdominal wall with perforation of a contralateral pyosalpinx into the rectum

Prognosis

The prognosis in gonorrheal proctitis is good provided early and active treatment is instituted Needless to say, appropriate therapy of the genital tract should be included

Treatment

During the acute stage confinement to bed and avoidance of instrumentation and irritating solutions are of prime importance The diet should be liquid or semisolid and the consumption of water greatly increased In the presence of diarrhea, however, the fluid intake may be regulated accordingly Soft evacuations may be obtained by the use of liquid petrolatum given twice daily in doses of from ½ to 1 ounce Instillations of ichthyol 25 per cent aqueous solution, silver proteinate, 5 per cent, or warm olive oil are soothing to the mucous membrane and tend to diminish coexistent tenesmus For the latter, the continuous application of compresses soaked in hot boric acid solution and hot sitz baths three or four times daily are helpful adjuncts during the acute stage When the symptoms are allayed sufficiently to permit examination Rosser[9] suggests irrigation of the anal crypts by means of a crooked sinus irrigator attached to a control syringe In chronic cases he applies a weak solution of silver nitrate to the crypt cavities after irrigation

Irrigations of normal saline solution or potassium permanganate 1 to 8 000, 110° F will lessen the discharge and offer additional comfort to the patient Protargol, 1 per cent or gentian violet, from 2 to 5 per cent, may be painted over the mucosal surface each day, whereas silver nitrate 10 per cent solution is applied topically to the erosions and ulcerations Insufflations of powder such as equal parts of calomel and bismuth subiodide zinc oxide or zinc stearate have proved of value after the acute symptoms subside The administration of aolan intramuscularly in doses of 1 cc at intervals of three or four days has been effective in some cases According to recent reports[10, 64] theelin has been used successfully in a small series of cases The injections are given every third day The use of

estrogens in treatment of constitutional symptoms has been advocated,[86] although the proctitis was not benefited Randall and Jackman advocated the use of sulfonamides, having found that gonorrheal proctitis invariably presented considerable problems in treatment prior to their advent



Fig 296 Chancroids of the perianal region

Turrell and Green[110] concluded that sulfanilamide is effective in the treatment of anal gonorrhea in the absence of either localized suppuration or poorly draining sinuses Cases treated by them showed no untoward reactions from the administration of the drug

According to recent reports the most *satisfactory treatment is penicillin one million* (1 000 000) units intramuscularly

Infected crypts should be ablated and associated abscesses quickly incised *Fistulae* are best cared for after the infection has become quiescent Should stricture occur, dilatation and the methods discussed under this heading may be instituted Some excellent results have been reported from the treatment with diathermy of the urethral and cervical infection of women suffering from gonorrheal proctitis[109] The method outlined by Cumberbatch was employed[18]

In each case treatment should be continued until all symptoms disappear, *the* inflammation is no longer visible through the proctoscope and several negative smears are obtained from the mucosa Measures to eradicate the infection from the *genital* tract should be instituted *In* women the cervix is treated with tincture of iodine or cauterized with the actual cautery Treatment of the urethral infection and massage of Skene s glands should not be neglected For combating arthritic involvement intravenous injections of mercurochrome 220, in doses of from 2 to 5 mg per kg, have been used with excellent results[116] From three to six injections are *given at intervals of two or three days* Pregl s iodine given intravenously in from 5 to 10 cc doses twice weekly, has been *employed effectively*[4]

CHANCROIDS OF THE ANAL REGION

Definition

Chancroids result from an acute specific infection occurring about the anus and perianal region caused by a specific microorganism the bacillus of Ducrey, and characterized by one or more auto inoculable ulcers[96]

According to Satulsky,[97] the incidence of

clinical chancroidal infection in females is much less frequent than in males Our experience with anal chancroids is based on 22 cases, 17 of which were observed in the out patient clinic of the Graduate Hospital prior to the era of sulfonamide therapy Sixteen of the twenty two were males

Etiology

The exciting cause is the bacillus of Ducrey,[7] which may be transmitted by uncleanliness careless habits contaminated towels or instruments,[117] sexual perversion such as sodomy, and vaginal or urethral discharges There is evidence that the Ducrey bacillus may exist in the female genitalia as a saprophyte and, when transplanted to other tissues, may then become a pathogen Levin[67] has postulated that the female may act as a symptomless carrier of the disease The disease is frequently associated with similar lesions on the penis or vulva Cases have been reported presenting lesions involving the perineal area and the intergluteal aspects of the buttocks[30]

Pathology

Chancroid occurs several hours (twelve hours to five days) after exposure It begins as a small reddish macule which successively changes to a papule and then a pustule The latter ruptures to form a circumscribed ulcer with sharply defined, irregular undermined edges and a gray, necrotic base (Fig 296) Usually the ulcers are multiple and tend to extend peripherally as well as to coalesce forming large irregular ulcers around which is an inflammatory areola As a rule the lesion is circular or oval in outline quite soft and covered with an abundant purulent secretion[96] In these cases involvement of the inguinal lymphatics is usually unilateral

Bacteriology and Histopathology

The bacillus of Ducrey is a short non motile gram negative streptobacillus with rounded ends observed frequently in chains[96] Tissue section of the lesion shows destruction of the epidermis and part of the derma with infiltration of small, round plasma and polymorphonuclear cells The blood vessels are only slightly changed and show no proliferation of the intima

Variations in staining reactions and characteristics have been described by various workers A recent method for culturing the organism has been devised by Dienst[0] who concluded that a medium containing defibrinated rabbit blood cystine, dextrose and beef infusion agar is best suited for the purpose He found that the bacillus grew best at from 28 to 32° C, with a certain amount of moisture necessary for growth on the surface of the medium

Symptoms

Chancroids are characterized by a short incubation period, usually from 24 to 72 hours Heyman's[41] cases approximated the same period of incubation The lesion or lesions are extremely tender and painful The discharge is profuse and purulent and frequently very irritating to the adjacent perianal skin The labia minora fourchette and perineum are also involved in the female[41] Due to irritability of the sphincter muscle defecation is attended by considerable pain

Diagnosis

The diagnosis of anal chancroids is made by the short incubation period multiplicity of lesions, absence of induration, the presence of pain and tenderness the property of auto inoculation[91, 96, 101, 107] and the presence of *B Ducrey* in the smears Patients exhibiting enlarged inguinal nodes should be tested by the use of lygranum[41, 91] before a diagnosis of chancroid is made The intracutaneous test devised by Ito Reenstierna[47] using Dmelcos vaccine (suspension of the bacillus of Ducrey and the streptococcus) has proved of value One tenth of a cubic centimeter of the vaccine is injected into the skin of the forearm of the patient A positive reaction is noted in from 24 to 36 hours by the presence of a large irregular erythematous elevation Smith[101] reported a test devised by Rosser

estrogens in treatment of constitutional symptoms has been advocated,[80] although the proctitis was not benefited Randall and Jackman advocated the use of sulfonamides, having found that gonorrheal proctitis invariably presented considerable problems in treatment prior to their advent

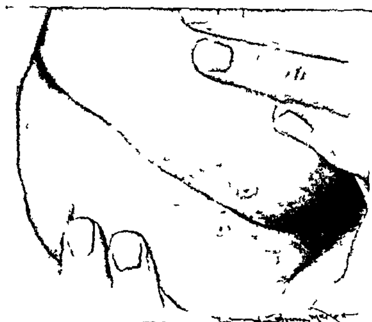


Fig 296 Chancroids of the perianal region

Turrell and Green[110] concluded that *sulfanilamide is effective in the treatment* of anal gonorrhea in the absence of either localized suppuration or poorly draining sinuses Cases *treated by them showed no* untoward reactions from the administration of the drug

According to recent reports the most satisfactory treatment is penicillin, one million (1 000 000) units intramuscularly

Infected crypts should be ablated and associated abscesses quickly incised Fistulae are best cared for after the infection has become quiescent Should stricture occur, dilatation *and the methods discussed* under this heading may be instituted Some excellent results have been reported *from the treatment with diathermy of the* urethral and cervical infection of women suffering from gonorrheal proctitis[109] The *method outlined* by Cumberbatch was employed[18]

In each case treatment should be continued until all *symptoms disappear, the* inflammation is no longer visible through the proctoscope and several negative smears are obtained from the mucosa *Measures to* eradicate the infection from the genital tract *should be instituted In women the* cervix is treated with tincture of iodine or cauterized with the actual cautery *Treatment of the urethral infection* and massage of Skene's glands should not be neglected For combating arthritic *involvement intravenous injections* of mercurochrome 220, in doses of from 2 to 5 mg per kg, have been used with excellent results[116] From three to six injections are given at intervals of two or three days Pregl s iodine given intravenously in from 5 to 10 cc doses twice weekly, has been employed effectively[4]

CHANCROIDS OF THE ANAL REGION

Definition

Chancroids result from an acute specific *infection occurring* about the anus and perianal region, caused by a specific microorganism the bacillus of Ducrey, and characterized by one or more auto inoculable ulcers[96]

According to Satulsky[96] the incidence of

clinical chancroidal infection in females is much less frequent than in males Our experience with anal chancroids is based on 22 cases 17 of which were observed in the out patient clinic of the Graduate Hospital prior to the era of sulfonamide therapy Sixteen of the twenty two were males

Etiology

The exciting cause is the bacillus of Ducrey,[7] which may be transmitted by uncleanliness careless habits contaminated towels or instruments,[117] sexual perversion such as sodomy and vaginal or urethral discharges There is evidence that the Ducrey bacillus may exist in the female genitalia as a saprophyte and, when transplanted to other tissues, may then become a pathogen Levin[6] has postulated that the female may act as a symptomless carrier of the disease The disease is frequently associated with similar lesions on the penis or vulva Cases have been reported presenting lesions involving the perineal area and the intergluteal aspects of the buttocks[90]

Pathology

Chancroid occurs several hours (twelve hours to five days) after exposure It begins as a small reddish macule which successively changes to a papule and then a pustule The latter ruptures to form a circumscribed ulcer with sharply defined irregular undermined edges and a gray necrotic base (Fig 296) Usually the ulcers are multiple and tend to extend peripherally as well as to coalesce forming large irregular ulcers around which is an inflammatory areola As a rule the lesion is circular or oval in outline quite soft and covered with an abundant, purulent secretion[96] In these cases involvement of the inguinal lymphatics is usually unilateral

Bacteriology and Histopathology

The bacillus of Ducrey is a short, non motile gram negative streptobacillus with rounded ends observed frequently in chains[90] Tissue section of the lesion shows destruction of the epidermis and part of the derma with infiltration of small, round plasma and polymorphonuclear cells The blood vessels are only slightly changed and show no proliferation of the intima

Variations in staining reactions and characteristics have been described by various workers A recent method for culturing the organism has been devised by Dienst,[0] who concluded that a medium containing defibrinated rabbit blood cystine dextrose and beef infusion agar is best suited for the purpose He found that the bacillus grew best at from 28° to 32° C with a certain amount of moisture necessary for growth on the surface of the medium

Symptoms

Chancroids are characterized by a short incubation period usually from 24 to 72 hours Heymans[41] cases approximated the same period of incubation The lesion or lesions are extremely tender and painful The discharge is profuse and purulent and frequently very irritating to the adjacent perianal skin The labia minora fourchette and perineum are also involved in the female[41] Due to irritability of the sphincter muscle defecation is attended by considerable pain

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and called by him "the Rosser scratch test"

Technic An outer portion of the buttock should be cleaned with alcohol and allowed to evaporate thoroughly and the skin to dry A sharp, sterile hypodermic needle is used, several scratchlike abrasions being made over the dry, cleaned area With a sterile cotton applicator, exudate from one of the ulcers is rubbed into the freshly made scratches

For control, the opposite buttock is prepared in like manner, but protected so that none of the exudate from the ulcerations impinges on the control zone A positive reaction will appear in the exudate treated zone in 48 hours, while the control will remain unaffected

Heyman, Beeson and Sheldon[43] quoted Kornblith *et al* [9] as having reported positive skin reactions in approximately 95 per cent, while Knott *et al* [7] postulated that only from 70 to 80 per cent showed positive skin tests These reports were based on a clinical diagnosis exclusively

The authors used the Lederle Ducrey vaccine, reporting 46 positive reactions out of 60 proved cases of chancroid It was their opinion that the positive reaction persists for years following its development, so that it cannot be certain that an admission test represents an existing or previous infection They believed that such a test should never be relied on as the sole method of diagnosis

These authors also used the Ito Reenstierna auto inoculation procedure In 20 of 36 cases a positive diagnosis was secured by the use of the method

Cole and Levin[13] described an intracutaneous test for chancroidal infection using sterilized pus from a bubo prepared similar to the antigen used in the Frei test Sanderson and Greenblatt[9] described a preparation made commercially and now available

There is disagreement as to time intervals between the appearance of the infection clinically and the skin response, varying from six days to five weeks according to different investigators using this allergic reaction of the skin [7, 23, 103] The Surgeon General of the United States Army,[1] in a circular letter to all army medical installations, advised that the Ito Reenstierna skin test and the staining or cultural isolation of the Ducrey bacillus were not recommended as routine procedures

Differential Diagnosis

Chancroids of the anus are to be differentiated from chancre, tuberculous ulcer, fissure and epithelioma, for which the reader is referred to Chapter 14 on Tuberculosis, page 430 Satulsky[96] stresses the belief that

Table 27 Differential Diagnosis

	Anal Chancroids	Anal Chancre
Incubation period	24 to 72 hours	2 to 6 weeks
Characteristics		
Auto inoculable	Yes	No
Shape	Circular or oval	Elliptical
Edges	Sharply defined not elevated	Irregular and elevated
Base	Granular necrotic	Indolent and gray indurated crust formation
Number	Usually multiple	Single
Consistency	Soft	Hard
Induration	None	Present
Discharge	Profuse purulent	Small amount and sticky
Pain	Marked	Slight if any
Site	Multiplicity of lesions about anal margin	Usually in anterior anal verge or lateral between radiating folds
Inguinal gland	Unilateral inflammatory and suppurate freely	Bilateral noninflammatory
Laboratory	Ducrey s bacillus in smears Reenstierna test positive	*Treponema pallidum* under dark field illuminator Later Wassermann Eagle and Kolmer tests positive

chancroid should never be diagnosed, de spite a typical clinical picture, until primary syphilis has been ruled out The distinguish ing characteristics of anal chancroids and chancre may be noted in the preceding Table 27, page 408 Heyman,[41, 42] in a study of 160 patients (Negroes) suspected of hav ing either chancroid or lymphogranuloma venereum, declared that many recent re ports on l venereum and chancroid assert that the clinical appearance of these entities are reliable criteria for their differentiation, and that the diagnosis of chancroid can be established in the majority of instances by clinical laboratory methods There are no simple and reliable methods of procedure however for the positive diagnosis of l ve nereum [9, 100]

Treatment

Cleansing the parts with soap and hot water twice daily is essential in all cases Cotton soaked with ether is also beneficial[3] Cauterization with the actual cautery, phe nol, acid nitrate of mercury or fuming nitric acid using procaine analgesia, is recommended[86] The phenol may be neu tralized by alcohol or tincture benzoin and the latter two by bicarbonate of soda fol lowed by dusting powders as dithymol diiodide stearate of zinc calomel or iodo form The application of argyrol crystals has been followed by good results and by some is considered specific After healthy granulations appear Martin suggests a powder of equal parts of acetanilid and calomel Silver nitrate from 10 to 20 per cent solution is effective in the presence of exuberant granulations If the exudate is profuse, powdered tannin may be added to the above dusting powder Instillations of hot olive oil and local application of com presses wrung out in hot boric acid solution will usually relieve associated tenesmus In some few cases divulsion of the sphincter may be necessary Sulfanilamide has been advocated in treatment [9, 86, 110] Sulfathia zole is recommended as the result of use in a series of cases consisting of 127 Negroes, 44 whites 3 Puerto Ricans and 1 Chinese[59] Both the oral and local use of the sulfon amides is recommended by these investiga tors, since no untoward reactions either systemic or otherwise, have occurred Smith,[101] following Rosser s method of using intravenous mercurochrome, 1 per cent solution, giving 2½ cc as an initial injection for tolerance testing, treated 6 cases of his own by the method If no untoward reaction occurs from the test dose in a 48 hour period 5 cc are then injected The dosage is increased 2½ cc each time until four injections have been given, each 48 hours apart All of the 6 cases treated by Smith healed successfully in an average of 14 days time with four injections No local treatment was used and no other con current enteral or parenteral therapy [101]

Surgical removal is indicated in cases that do not respond to the above treatment From five to ten minims of procaine, from ½ to 1 per cent solution, are injected under the base, and each chancroid is excised with scissors scalpel or endotherm According to Satulsky[96] local surgical procedures are now strictly avoided during acute phases of the disease, in recent years having been found unnecessary in some cases being dan gerous procedures During surgical manipu lations the infection may be transmitted by means of towels, dressings and instruments Rauschkolb[98] found auto inoculations along the lines of incision in a series of 247 cases Firm pressure momentarily applied is usu ally sufficient to control the bleeding The wound is then covered with gauze impreg nated with sterile petroleum jelly If the sphincter muscle is markedly tonic, divul sion should precede excision of the ulcers After treatment consists of daily cleansing and the use of a mild antiseptic solution or ointment

SYPHILIS

From the standpoint of the proctologist syphilis is of undoubted importance for anal lesions may be of direct luetic origin Systemic manifestations of the disease, par

ticularly those of the central nervous system, may give rise to symptoms referable to the rectum



Fig 297 Anal chancre

Definition

Syphilis is a chronic infectious and contagious disease either congenital or acquired It is caused by the *Treponema pallidum* and is encountered in the anus and rectum in the primary, secondary and tertiary stages

Etiology

The specific cause is the *Treponema pallidum*[35] acquired by sexual perversion,[60 62 68] innocent contacts and carelessness Infection may arise through contamination by clothing[68] or, in women, as a direct spread from a genital lesion or vaginal discharge The spirochete is a delicate, spiral organism presenting from 8 to 14 regular turns and having pointed ends It is flexible and motile

Syphilis of the Anus

Anal Chancre The primary lesion is more frequent in women than in men, due no doubt to contact during natural coition[34 63]

Pathology The chancre which is the primary lesion of syphilis begins at the point of inoculation from two to six weeks after the infection Approximately 14 per cent of extragenital chancres occur about the anus[76] and its usual site is about the anal margin Kallett and Martin, in reporting a series of anorectal chancres in 1925, stated that the appearance of the primary lesion is modified by maceration and contamination brought about by locale in its evolution tending to go through 3 stages (1) ulceration, (2) dermatitis and (3) condyloma, the last at times involving the entire perianal region, and unless the condition is recognized as a manifestation of primary lues confirmed by darkfield procedure, an erroneous diagnosis of simple ulcer or condyloma acuminata is apt to be made (Fig 297) Chancre of the rectum however, is extremely rare[6] Jones and Janis[40] reported a case of rectal chancre *existing simultaneously with gonorrheal* proctitis in the same patient Singly or concurrently, they both are considered rare phenomena, since the literature on the subject fails to record other such occurrence

Levy and Winkelstein[63] stated that syphilis of the colon and rectum has been reported in both hereditary and acquired lues *and that rectal involvement was commoner* in the acquired form and more frequent in women than in men the frequency in the former being due to the proximity of the vagina and rectum Chancre of the rectum they found *to be extremely rare* revealing itself as a shallow, punched out ulcer with indurated base from which the spirochetes may be recovered They found that anal chancre is more frequent, is located invariably in the anal folds, is superficial has an indurated base, often resembles fissures and is difficult to diagnose

Cases of extragenital chancre being superimposed on hemorrhoids have been reported in the literature Porter[83] reported a case in a female colored patient She had had a hard chancre superimposed on a hemorrhoid On repeated and persistent questioning no contact history was elicited

Roche and Hall[59] report a case of primary syphilis in a white male patient involving an external hemorrhoid According to the patient, the infection was incurred by his using an apparently infected douche nozzle in the self administration of an enema

Lynch and Hamilton[78] report that rectal chancre is one of the rarest forms of the disease, occurring only by direct implanta tion on a denuded portion of the rectum Lesions at this site may and do present severe pain or a feeling of ampullary full ness and emit a mucopurulent or purulent discharge and, in addition blood is often present The base of the lesion is not ad herent to the deeper structures Ruiz[63] reported a case of syphilis of the sigmoid with concurrent megasigmoid Beginning as a small erosion the chancre appears as a single ulcer, circular in outline or, if it is between the radiating folds elliptical It is firm with rose colored elevated borders and the floor indolent and gray The exudate is purulent slight in amount and usually sticky[5] Quite frequently, multiple fissures occur as a result of the secretion from the chancre Inguinal lymphatic involvement occurs from three to five weeks after the primary lesion and is usually discrete hard and bilateral It has been mentioned that the glandular involvement following chan cre in this location reaches larger propor tions than when the disease is of genital origin[40]

Histopathology The main changes are in the cutis as presented by the formation of new capillaries surrounded by round cells and later by plasma cells Infiltra tion is at first circumscribed but later diffuse The infiltration shows periva cular arrangement and proliferation of the intima of the blood vessels so as to narrow or even occlude the lumen[3] Polymorphonuclear infiltration is present beneath the ulcerated surface to some degree and treponemata can usually be seen Yeomans[11] classified infectious granuloma as a specific disease in the course of which nodules or granules are produced which have a certain but vari able resemblance to inflammatory granula tion tissue, either grossly or microscopi cally He believed that syphilis was among the many causative factors responsible for the entity

Symptoms The symptoms begin as an itching or tingling sensation about the anus,



Fig 298 Syphilitic ulceration of the anal canal and the perianal re gion

so that after scratching off the crust which forms, a painless ulcer remains In the presence of mixed infection or when the lesion occurs within grasp of the sphincter muscle, pain and tenderness, may exist The discharge in these cases is slight in amount and is adherent

Diagnosis Clinically, the diagnosis of anal chancre is made by the period of in cubation, from two to six weeks, by the location which is usually lateral, the fact that it is painless with elevated, indurated edges the finding of the spirochete in the discharge or scrapings from the ulcer under darkfield illumination and the lymphatic inguinal enlargements An absolute diag nosis however, can be made only by em ploying laboratory methods Here the dark field illuminator using unstained smears is the only means of demonstrating the motile Spirilla[68] Special stains as the Wright s and Giemsa s as well as the silver impreg

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Cases of extragenital chancre being superimposed on hemorrhoids have been reported in the literature Porter[83] reported a case in a female colored patient She had had a hard chancre superimposed on a hemorrhoid On repeated and persistent questioning no contact history was elicited

Lichtenstein[c] reported another case in which pathologic changes due to a toxic myelopathy were present The case recovered following sulfathiazole therapy and forced fluids, at no time did the patient exhibit signs of hemorrhagic encephalitis Neoarsphenamine had been used in treatment

The result of these procedures, or of intravenous infusions, increases the incidence of complications referable to the nervous system Myelopathy is a rare sequel Glaser and the Immermans,[31] in reviewing the literature, found 8 cases of myelitis in a series of 161 patients

Hazen suggests the following for routine use eight injections of arsphenamine the first two at 4 or 5 day intervals and the remaining injections at intervals of one week a course of 12 mercury injections given at weekly intervals a second course of from 6 to 8 arsphenamine injections given at weekly intervals, a course of mercury and bismuth injections similar to the first, a third course of arsphenamine, a course of mercury similar to that already advocated, and a fourth course of arsphenamine consisting of six injections at weekly intervals In each case treatment should be continued for at least one year after clinical symptoms disappear and the blood is negative In latent syphilis the treatment should



Fig 300 Condyloma latum

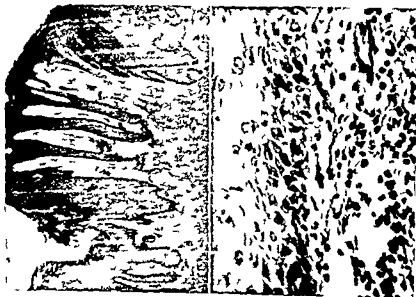


Fig 301 (*Left*) Low power section through a condyloma latum showing immense acanthosis with elongation of the interpapillary pegs The corium is edematous and infiltrated with chronic inflammatory cells (*Right*) Section through the corio epithelial junction of a condyloma latum under high power magnification Note the dense infiltration of the cutis with plasma cells

nation method, will be found serviceable.[30, 117] As a routine procedure a blood

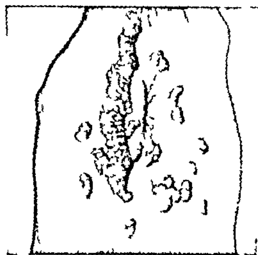


Fig 299 Condylomata lata of the perianal region

Wassermann test should be taken, although it will be remembered that such is rarely positive until the second, third or fourth week after the onset of the chancre.[16, 60, 78] The Kolmer Wassermann reaction[48] on the blood has proved superior in this respect.[46] The "local" Wassermann technic devised by Klauder and Kolmer,[5] in which the exudate from the chancre is utilized, has effected a large percentage of correct results.[2, 104]

Differential Diagnosis The distinguishing features of chancre, chancroid, epithelioma, fissure and tuberculous ulcer may be found on page 416, this chapter, and in Chapter 14, Tuberculosis, page 431.

Miles[79] described the syphilitic fissure as being usually multiple, generally situated on the lateral anal margins and seldom in the midline either anteriorly or posteriorly. The fissures bleed readily when the edges are separated, and *pain is present during* evacuations, ceasing on completion of the act. The horizontal set of inguinal lymphatics are enlarged, hard and invariably painless. Other luetic signs are present, such as mucous oral tubercles and various syphilodermata.

Treatment It is generally considered unnecessary to employ local measures where the lesion is definitely diagnosed as syphilitic. In some cases, however, local treatment is a warrantable procedure. For local treatment, Lynch and Hamilton[63] advocate lavage with potassium permanganate, 1 10 000 solution, followed by insufflation with calomel and zinc oxide in equal parts. The movements should be kept soft by the use of liquid petrolatum once or twice daily as indicated. In the presence of tenesmus, instillations of hot olive oil or the local application of compresses wrung out in hot boric acid solution may be used to relieve the distress. The parts should be cleansed with soap and water and mercuric chloride 1 to 2,000 solution. This is followed by the application of some dusting powder such as calomel,[65] iodoform or the subiodide of *bismuth. Crustations may be removed with* warm starch water. Ordinarily ointments are objectionable, yet if crusts are present or if the surface is hard and dry, ammoniated mercury, 10 per cent, or a compound iodine preparation will prove beneficial.

Destruction by means of the actual cautery is advocated by some observers. Complete excision of the chancre with the endotherm has proved satisfactory in many cases, and on the continent especially is frequently employed. Here the area is infiltrated with a solution of procaine, 1 per cent and totally excised. Bleeding is controlled by pressure temporarily applied and the wound covered by gauze impregnated with petroleum jelly.

Systemic Treatment A thorough course of antiluetic treatment should be given[67] using one of the arsenicals such as arsphenamine[14] or neoarsphenamine. Bismuth or mercury may be used in conjunction with the above. Care should be exercised in the *administration of the arsphenamines, as the following case report* by Sabs and Nomland[94] will show.

White female, aged 26, para v, developed an acute myelopathy resulting in absence of all reflexes, loss of rectal and urinary control also occurred as a result of treatment by means of multiple injections of mapharsen

from the acuminata type in that they do not possess a pedicle or cauliflower lobulations Mucous patches are observed intrarectally so rarely that they constitute 'museum pieces'[1,68]

HISTOPATHOLOGY There is a marked development of the epidermis in which the down growths are broader and deeper than is usual Infiltrations of round cells and plasma cells are present with fibrous pro

TABLE 28 CONDYLOMA LATUM
(Author's Series)

AGE	RACE	SEX	LOCATION
17	Colored	Female	Anal canal and vulva
18	Colored	Female	Perianum
18	White	Male	Anal canal
20	Colored	Female	Anal margin and perineum
23	White	Male	Anal margin
27	Colored	Male	Anal margin
32	Colored	Male	Anal margin





FIG 303 (*Left*) Condyloma latum of the anoperineal region Examination with Levaditi's stain showed syphilitic process Wassermann positive (*Right*) Esthiomene Photograph of a large granulomatous mass involving the vulva and the anus This patient a Negress, age 24, was pregnant and *cesarean section was* necessary Frei test positive tissue characteristic of lymphogranuloma venereum Such a condition may be confused with condyloma latum

liferation (Fig 301) Treponemata are seldom seen

SYMPTOMS Usually the patient cites the presence of a wartlike growth beside the anus, and some moisture which is associated with itching and a smarting sensation In secondary lues mucous and perineal patches occur[63] They are practically nonexistent in the rectum Due to moist locale they *macerate, resembling* acute eczema but there is little or no itching In other instances mention may be made of a single wart which by contact affected the opposite side The exudate is thin moderate in amount and its odor may best be described as sickish and musty[4]

DIAGNOSIS The history of a primary lesion the presence of a wartlike elevation presenting the above characteristics and a positive Wassermann will serve to determine the diagnosis when the treponemata cannot be demonstrated (Fig 303)[63]

DIFFERENTIAL DIAGNOSIS Condyloma latum is to be distinguished from condyloma acuminatum verrucous tuberculosis and esthiomene (For the last see Chap 11 Lymphopathia Venereum)[59, 63]

SYPHILIS OF THE RECTUM

Although infrequent syphilis of the rectum may be present as a secondary or tertiary manifestation and apparently is

begin with mercury rather than with the arsenical Penicillin and streptomycin therapy are discussed on page 421

Condyloma Latum Condyloma latum (papular syphilide), luetic condyloma or begins as a flat, oval or rounded patch on the skin surface As a rule it is pearly white in color Gradually these plaques multiply and in the course of their development have a tendency to form large fungating masses



Fig 302 Condylomata lata (C L Martin)

syphilitic wart is a secondary manifestation of syphilis of the anorectum It occurs within the anus or in the perianal skin and is characterized by wartlike elevations, single or in groups, which are highly contagious and auto inoculable Secondary rectal and anal lesions occur frequently but are most often overlooked [2] Ingraham Stokes *et al* [4] reported a case in their series of pregnancies treated with penicillin who was delivered of a physically normal infant She had developed condyloma lata, which proved on darkfield examination to contain the *S pallida*

Etiology The specific cause is the *Treponema pallidum* acquired probably by the discharge from syphilitic patients [45]

Pathology Condyloma latum may be described as a productive granuloma which frequently encircling the anus or extending to the vulva and scrotum (Fig 299) They appear as broad flat, warty elevations, the edges of which are sharply defined and rise at right angles from the skin The surface is flat and covered with a grayish necrotic membrane that is more or less glistening They are contagious, auto inoculable and secrete a foul smelling discharge Superficial ulceration is frequent Serology is at this time usually reported negative Unless the condition is recognized as secondary lues and confirmed by darkfield procedure, an erroneous diagnosis of simple ulcer or condyloma acuminatum may be made [5] In the tertiary stage the patches become elevated but are pressed flat by the buttocks [63 69] They are termed condylomata lata, due to their shape They are to be differentiated

TABLE 30 DIFFERENTIAL DIAGNOSIS OF PROCTITIS

	Syphilitic	Amebic	Bacillary	Chronic Ulcerative	Tuberculous: Ulcerative	Tuberculous: Hyperplastic	Gonococcic
Etiology	*Treponema pallidum*	*Endamoeba histolytica*	*B dysenteriae*	Bargen's diplostreptococcus	*Myco tuberculosis*	*Myco tuberculosis*	*N gonorrhoeae*
Histologic location	Submucosa	Submucosa	Mucosa	All layers	Submucosa	Submucosa	Mucosa
Manifested	Secondary	Primary	Primary	Primary	Secondary	Secondary	Primary
Onset	Chronic	Insidious	Acute	Chronic with acute exacerbations	Chronic	Chronic	Acute
Age	30-40	20-35	Under 35*	20-40	0-40	20-30	20-35
Fever	None	Present if acute or complicated	Always present	Slight or moderate	Slight	None	Slight
Ulceration	Ulcers punched out or craterlike base leathery edges sharply defined	Frequent ulcers are troughlike base deep and yellowish gray edges irregular raised and indurated located on prominent folds of bowel wall or on valves of Houston	Not characteristic ulcers usually superficial edges sharp base brown in color and shallow	Ulcers of small size and numerous	Ulcers shape oval or elliptical usually transverse to long axis of gut base gray elevated with yellow tubercles edges undermined	Infrequent	Occasional
Surrounding mucosa		Inflamed	Normal	Diffusely inflamed and granular			
Prostration	None	Marked	Slight or moderate	Marked during acute phase	Secondarily marked	Slight	None
Laboratory	*Treponema* may be demonstrated by the darkfield illumination technic Wassermann positive	Ameba and cysts in stools and scrapings Mononuclears	*B dysenteriae* in stools and scrapings polymorphonuclears agglutination of blood serum	Diplostreptococci isolated from bases of rectal ulcers	Tubercle bacilli in scrapings and stool Usually shown by guinea pig inoculation and by serial section of tissue	Tubercle bacilli in tissue	Gonococci in smears
Roentgenogram after opaque enema		Usually unsatisfactory irregular deformity if process is extensive		Hypermotility contour smooth with loss of haustrations occasionally appears feathery or fringed	Hypermotility and filling defects		
Treatment	Responds to antiluetic and penicillin therapy	Responds to specific measures	Responds to antidysenteric serum and sulfathalidine	Measures outlined in Chap 9			Responds readily to penicillin therapy

* usually

TABLE 29 DIFFERENTIAL DIAGNOSIS

	CONDYLOMA LATUM	CONDYLOMA ACUMINATUM	VERRUCOUS TUBERCULOSIS
Origin	Begins as a broad flat papule or elevation covered with macerated epithelium	Begins as a firm fragile wartlike elevation	Begins as a small plaque or wartlike papule
Characteristics Appearance	Flat warty elevation, edges sharply defined rise at right angles to skin Tend to form large fungating masses Fissuring common Usually no pain	Occur as projections or tufts springing from a single elongated pedicle to form single or multiple vegetations about the anal margin Glistening and pale pink in color with elevated edges	Warty or papillary excrescence scalloped in outline, definitely circumscribed brownish red, mammillated and rough
Number	Single or in groups	Usually in groups	At first single gradually increases in size and number
Ulceration	Frequent	Occasional	Occasional
Discharge	Slight in amount offensive	Slight in amount	Moderate thick and foul smelling
Laboratory	Treponema may be demonstrated in serum expressed from base of papules or in scrapings Wassermann Kahn and Kolmer tests positive		Tubercle bacilli in scrapings Tissue section shows typical histologic tubercles Tuberculin test positive

more common in women than in men [8] Primary ulceration or chancre, however, is exceedingly rare in the rectum [*, 64, 68]

Syphilitic Proctitis PATHOLOGY The *Treponema pallidum* is the specific cause, but secondary infection usually plays a part [43, 48] The mucosa and submucosa are involved and become fragile, although at first the mucous membrane appears almost normal In part this is due to the fact that in syphilis the lumen of the arteries is greatly diminished by a progressive endarteritis and thickening of the adventitia which results in deprivation of blood to the tissues [114] This is followed by necrosis and ulceration The ulcers are somewhat punched out with sharply defined edges the base is indurated, leathery or parchment like and occasionally covered by a greenish yellow exudate [68] Ordinarily, it is most difficult to distinguish between this and other types of ulcerations The wall of the rectum feels thick and rigid due to the deposition of fibrous tissue, so that there is a gradual loss of its resiliency and contractility As a result of the enormous amount of fibrous tissue deposited in and between the layers of the gut, it is possible for contraction to ensue with the formation of a stricture Such, however, does not necessarily mean that this stricture is syphilitic In other words, it is not denied that a stricture may follow a syphilitic process but it is our opinion that stricture formation is the result of the chronic productive exudate which is Nature's attempt at healing and which occurs in any ulcerative process

Stricture, according to Kallett [*] occurs principally in the female Negro, 39 per cent of them showing positive serology The finding in his series was coincidental rather than basic Conforming to a definite syndrome, Kallett gave them the appellation of proctitis obliterans' which features the length of the stenosed area [68] Digital and proctoscopic findings are characteristic, according to him Digitally, the stricture is more rigid and inelastic than in carcinoma The surface, while ulcerated, lacks the friability of malignancy The entire rectal surface is involved which differs from the predominant unilateral cancerous distribution Luetic strictures are rare if they ever do occur [68] At one time it was common practice to denote all tubular rectal strictures luetic but closer study has precluded this diagnosis

Table 31 Differential Diagnosis

	Gumma	Tuberculoma	Sarcoma
Age	Middle life	20 40	30 50
Race	White or colored	Colored	White
Sex	Women	Males	Males
Onset	Insidious	Insidious	Rapid
Ulceration	*Frequent*	*Uncommon*	Early
	Movable	Movable	Fixed
			Metastasizes
	Other manifestations of lues	T B elsewhere	Cachexia
	Responds to antisyphilitic treatment		Ascites
Laboratory	Wassermann positive	*Miliary tubercles characteristic of* T B	*Biopsy positive*

the rectum begins in the submucosa forming round or oval swellings varying in size from a pea *to an orange*[5, 10] *Either single* or multiple these swellings are firm and smooth to the touch are blue or purplish in color are painless and ulcerate regularly Gummatous involvement of the perirectal tissues is extremely rare[36, 3, 111]

Gummata of the caudad bowel is a rare entity[69] In all cases encountered impaired blood supply attributed to luetic endarteritis was a factor Over a period of 27 years Martin[3] found but 2 rectal gummas both extensive both obstructive, and both located intrarectally One was a large smooth spheroid protruding from the posterior aspect to such an extent that passage of a proctoscope through the rectum was impossible The other possessed a tortuous lumen extending throughout the entire rectum In neither instance was the mucous membrane broken No ulceration bleeding nor other local symptomatology was evident except a sensation of fullness and obstipation Both were males one aged 55 the other 35 Both were placed on saturated solution of potassium iodide *with prompt* regression of the growths In no way did either case conform to the usual description of multinodular gummata i e soft and gummy with occasional ulceration and disintegration

Symptoms The symptoms for the most part are indefinite yet such should always invite a careful digital and proctoscopic examination A sense of weight in the rectum and incomplete movements are frequently *complained of but are usually* proportionate to the degree of pathology present[3] The passage of blood and pus is complained of later and indicates that ulceration has occurred in which case tenesmus and diarrhea are usual

Diagnosis A diagnosis is made by the palpation of a firm painless egg shaped mass which, through the proctoscope appears blue or purple in color and by the existence of a positive Wassermann or Kahn Biopsy will confirm the diagnosis

Treatment The treatment previously outlined should be instituted but must be continued for several years For *this purpose* mercury or the iodide of potassium in ascending doses may be given A Wassermann test should be taken at yearly intervals If it is positive a course of six injections *of some form of* arsenic should be instituted to be followed again by mercury or the iodides For penicillin and streptomycin therapy in syphilis see page 421

Ataxic Sphincter

This is a late manifestation of syphilis Martin[70, 71] in 1904, was the first to mention this condition and report a series of cases of locomotor ataxia (tabes dorsalis) in which ataxia of the sphincter muscle was an early sign As a result of degenerative changes in the posterior nerve roots and posterior columns of the spinal cord sen

Yeomans,[114] in discussing rectal stricture, postulated that prior to the discovery that lymphogranuloma is the leading etiologic agent in producing rectal stricture lues was regarded as the chief causative factor Of 42 cases reported by the author and considered to be luetic, 15 were males, 27 females ranging in age from 20 to 57 years 21 white 21 colored It was found that antiluetic therapy afforded no appreciable change on the fibrous stricture but its systemic effect warranted its use Blood Wassermanns were positive in 31 negative in 5 and not recorded in 6

Our belief is based on our histopathologic *investigations and observations of many* specimens In no single instance of stricture of the rectum have we been able to demonstrate a picture characteristic of a typical syphilitic process Proliferating proctitis rarely occurs[69] It has been known to produce a true rectal obstruction

Symptoms The symptoms of uncomplicated syphilitic proctitis are vague and not entirely unlike other varieties of inflammatory conditions in this part of the intestinal tract Usually the evacuations are incomplete the stools frequent and mixed with blood and greenish yellow pus Tenesmus and discomfort in the rectum are often mentioned by the patient

Diagnosis A history of pederasty will arouse suspicion of a venereal infection but as a rule these patients are reticent about divulging their personal habits [9] At times the occurrence of a primary sore may be mentioned On digital examination the ulcer feels craterlike with its base firm and undermined while the wall around the ulcer is thick and inelastic On proctoscopy these ulcers which tend to extend transversely,[69 87] appear punched out with sharply defined edges and a leathery base

Laboratory Methods In each case scrapings from the ulcer or the expressed serum should be examined under the microscope using the darkfield illuminator in an attempt to demonstrate the *Treponema* The blood Wassermann and Kahn and Kolmer tests are positive at this time A spinal fluid Wassermann always should be taken where secondary or tertiary lesions are suspected

Treatment The antiluetic treatment as outlined on page 412, which includes the use of arsenic, mercury, bismuth, the iodides and penicillin is recommended Locally, irrigations, instillations and symptomatic treatment as enumerated in other forms of proctitis (Chapter 8) have proved to be beneficial If stricture is present antiluetic treatment should be continued for even though the treatment has no effect on the local pathology pain is diminished by its administration[9] (See p 384, Chap 12 *for treatment of stricture*)

Three courses of treatment have been advocated,[111] preventive, palliative and operative Sulfonamides have been used as adjunctive treatment Penicillin and streptomycin therapy on page 421

Included in operative procedures are colostomy, perineal excision and abdominoperineal excision with permanent colostomy a few cases of which have been reported

Gummata

Gumma is the most common tertiary manifestation of syphilis and frequently follows closely on the heels of the secondary eruptions The condition has been observed more often in women than in men[1 61 113]

Tertiary or late lesions with gumma formation and the like are uncommon[5] Occasionally the localized syphiloma is encountered which may simulate carcinoma, as in one case reported by Kallett The surface of the growth was ulcerated and the base indurated, having all the earmarks of carcinoma On report of a positive serology, a diagnosis of syphiloma was made, antiluetic therapy prescribed, and prompt regression of the lesion occurred The tertiary gumma *is important*[63] *It is prone to ulcerate* resulting in stenosis In a great majority of cases gummata are limited to the few centimeters of rectum immediately cephalad to the anus Rectal luetic stenosis is a rarity

Pathology Gummous inflammation *of*

ant evacuational difficulty On straining, bright red blood was expelled, which suggested possible malignancy On subsequent re-examination, the extruding rectal mass which was present lost its feeling of hardness and was found to be pulsating A diagnosis of aneurysm was made and vascular studies confirmed it A subsequent exploratory laparotomy revealed an aneurysm of the left external iliac artery Another case was reported recently by Kratzer[118]

Lynch and Hamilton[78] state that by far the most common and the most important phase of tertiary syphilis is loss of sphincteric tone, the anorectal ring becoming puttylike and retaining the shape of the examining finger or instrument This is one of the earliest signs of tabes dorsalis and it may precede the loss of knee jerks and the development of the Argyll Robertson pupil Martin[77] reported a male patient aged 35, hospitalized with a luetic history being treated at the time for tabes and gastric crises Potassium iodide cleared up the condition within 6 months a rectal gumma which had been present having disappeared the rectum appeared normal

O'Leary and Kierland,[80a] commenting on today s treatment of lues stated that among patients with the parenchymatous forms of neurosyphilis such as tabes dorsalis the response to penicillin in the reactions of the spinal fluid was less decided than among patients with the less severe luetic types Also in this group it was observed that the concurrent administration of the drug during a course of malarial therapy achieved better serologic reversals than did the unfortified penicillin The exact status of the drug in syphilis is not known at present That it has definite therapeutic merit, produces few reactions and may be given in short courses with minimal technical difficulties is admissible, making it worthy of trial

Scherlis and Caravati[93] stated that it was important to note in the administration of pyretotherapy therapeutically, using the *malaria technic* in the treatment of neurosyphilis that those of the Negro race be given the *Plasmodium malariae* while the white race should be given the vivax strain Ten periods were given in their series of 128 cases, unless complications were evidenced Reinoculation was necessary in 10 instances to obtain the desired 50 hours of pyrexia over 104° F

Tashian[107] in discussing tabes, stated that the medical profession should dismiss the impression that tabes denotes faulty locomotion, it being a progressive neuromuscular in co ordination, or neuromuscular imbalance, with a progressive impairment of function particularly in the bladder and (rectal) sphincter These manifestations are very often preceded by the so called tabetic crises with loss of muscle and vibratory sensibility In normal sphincters, on digital examination, the finger is tightly grasped by the sphincter but where the anal reflex is lost, the finger is no longer grasped the anus remaining open He determined that this was due to autonomic imbalance or dysfunction with attendant tonal loss in the nonstriated sphincter muscle Of 390 cases treated a diagnosis of tabes was made by rectal findings alone on 20 patients

Penicillin Therapy The precise manner in which penicillin acts to eliminate and destroy pathologic organisms is as yet undetermined[11, 77, 7] The drug differs in many ways due in all probability to its not being a protoplasmic poison It thus resembles the sulfonamides as both types of drug act the role of inhibitors of pathologic growth

Its action is probably an interference with the normal completion of various metabolic changes, leading eventually to cellular extinction of the invading organism that causes the distinctive syndrome which is attacking the body

Relevant to its action on the *Treponema pallidum* very little if anything is definitely known of the life habits of the spirochete, either in relation to its construction, mode of reproduction or its entire life cycle, the latter phase yet to be specifically determined

Many cases of lues, both congenital and

sory paralysis of the external sphincter occurs so that varying degrees of incontinence may ensue Such may be readily demonstrated by separating the anal margins laterally, thus opening the anal aperture When the anus is permitted to close, which normally it does immediately, the aperture in tabes remains open and very slowly assumes its usual state of contraction The same may be noted when the finger is introduced into the rectum and firm pressure made laterally As the finger is withdrawn the anus remains relaxed for many seconds before contracting to its previous tonicity, hence the term "patulous anus" is often applied This has been reported by others[3, 21, 33, 2, 68, 73, 81, 8, 09, 10]

The severe stretching pain in the rectum, "rectal crisis," should be mentioned as an early symptom of cerebrospinal syphilis Asmundson[3] and Drueck[1] reported cases of tabes dorsalis involving the rectum, the latter author reporting colonic involvement in addition to rectal A patient whose chief complaint was evacuational difficulty came to consultation The symptoms were nausea and vomiting bloody stools and increasing constipation with lower abdominal pain radiating dorsad The lower ileum was spastic and the transverse colon irritable A barium enema was unsuccessful, due to a terrific sigmoid spasm Rectum and sigmoid showed no intrinsic pathologic change The sphincter was "ataxic," contracting slowly Diagnosis of advanced tabes with concurrent colonic paresis was made Cobra venom was used in treatment, 1 cc being administered deeply intramuscularly The author stated that while arsenicals and mercury are indicated pyretotherapy is interdicted

Mercury and the iodides with arsphenamine and also neoarsphenamine are useful, if care is taken when the latter two drugs are employed

Asmundsen's case presented the typical "ataxic sphincter" to a very marked degree

Gomes[3] reported a case of tabes the symptoms of which did not become manifest for more than 50 years following the original luetic infection Penicillin was administered intraspinally daily for seven days, and simultaneously by intramuscular injection for 10 days The total intrathecal dosage amounted to 297,500 units, and 812,500 units were administered intramuscularly At the termination of treatment a severe gastric crisis developed, in all probability resulting from the intense alkalization with the sodium penicillin and concurrent large doses of dextrose solution Several weeks following therapy, lightning pains were relieved approximately 75 per cent Urinary and rectal together with the gastric dysfunction disappeared, and the general condition was greatly improved, with return of some reflexes

Green and Block[37] examined 6,150 patients, noting anal tone change in 376 In none was the neuropsychiatric diagnosis known prior to digital and proctoscopic examination Anal tone was divided into three grades

1 plus Some loss in tone detected in course of digital examination

2 plus Where the anal canal was sufficiently relaxed to permit reintroduction of a ¾ inch proctoscope without employment of an obturator

3 plus Where a completely relaxed and patulous anus was observed, i e, on separating the buttocks, the anus opened widely

Of the 6,150 examined, 6 1 per cent were found to have some loss in anal tone Of these latter, 27 per cent were due to proctologic disturbances, 14 per cent were non luetic neurologic conditions One hundred thirty three, or 35 per cent of the 376, were neuroluetics Twenty five per cent of the entire group of 6,150 revealed posterior nerve root involvement as the direct cause of "ataxic" sphincter

Kallett[5-] reported an unusual case A 55 year old male Syrian who a few months previously had completed a course of malarial therapy for early central nervous system lues was hospitalized with a chief complaint of rectal "fullness" with attend

with notable promptness Relief has listed from several weeks to many months some times longer It may prove of benefit in the presence of either sigmoidal rectal or anal involvement, with the probable identical therapeutic response At any rate it would be worthy of trial in this phase of luetic involvement

LYMPHOGRANULOMA VENEREUM

Lymphogranuloma venereum should probably be included under the heading of venereal diseases but since various phases of this condition must be considered the reader will find this subject discussed in Chapter 11

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acquired, are found to be penicillin resistant, as is evidenced by infectious or serologic relapse The arsphenamines are not dissimilar in action

In the treatment of neurosyphilis, O'Leary, Brunsting and Ockuly[80] determined from their observations that clinical manifestations, such as ataxia, crises, both rectal and gastric, incontinence, etc, were not benefited where the drug was given alone Administered in combination with fever therapy, either malarial or the fever machine, it failed to improve the clinical results noted from fever treatment

Goldman[3] treated 18 cases of neurosyphilis, four of them having tabes, two in a hospital and two from his private practice Two had had intensive antiluetic treatment for an extended period but were considered well otherwise The other two manifested typical motor phases with ataxic lower extremities They likewise had received treatment by pyretotherapy, arsenicals and bismuth with apparent symptomatic arrest but certainly inadequate improvement in the chief luetic manifestations Penicillin was administered intrathecally Six daily injections were given with a resultant total of 100 000 units No other medication was used during this period One patient received aldarsone, beginning one week following the penicillin therapy Periods of observation on the ataxic group were considered too brief for definite conclusions A certain amount of decided improvement was clearly manifested in at least one case and it was the author s opinion that the spinal nerve root pain in tabes is apparently rapidly relieved by the intrathecal administration of the drug

Stokes, Sternberg *et al*[10] studied 182 cases, drawn from eight clinics and observed for periods ranging from 8 to 214 days following institution of treatment There were 56 cases of paresis and 122 of neurosyphilis It was determined that penicillin injections of low or high intensity resulted in no recognizable striking difference between the effects of shorter time intervals or larger dosage in cases of tabes except the induction of Herxheimer reactions, which were avoided by reduction in the dosage of the first 24 or 48 hour periods The authors have determined that penicillin is not a reactionless drug and the disposition "to pour it about like water may lead to serious trouble, especially from therapeutic shock and possibly also from therapeutic paradoxical effects" In 23 of the 182 cases pyrexia at times reached 105 5° F One fifth of the cases (14) of tabes improved 50 per cent or more Of seven with lightning pains, two were completely relieved, one improved 50 per cent, two improved 25 per cent, one remained unchanged and one worse The continuous drip procedure was advocated, as it maintained a more or less constant blood level according to Barksdale, who treated 11 of 161 cases by this procedure

Ingraham, Stokes *et al*[4] report a case of a pregnant woman delivered of a physically normal infant She had developed condyloma lata, which proved on darkfield study to contain the *Treponema pallidum* The authors declare that the drug represents a distinct advantage in that it is convenient, safe and an effective mode of therapy which in the future will more than likely be the method of choice in this field

Streptomycin Therapy Nichols and Herrell[9] quoted Heilman, who suggested that streptomycin possessed some antispirochetal activity The authors tried the effect of the drug on four cases of lues The results were inconclusive, due to inadequate dosage However, it did not appear to them that streptomycin was particularly effective in the treatment of syphilis

Thiamine Hydrochloride Therapy Kesert and Grossman[34] treated eight cases of tabes exhibiting phases of lightening pains and gastric crises Some, but not all, were receiving the medication per oram or subcutaneously, but the immediate relief noted was due exclusively to the intrathecal administration of the drug Pain was intensified following the injection for a 12 hour period, after which the pains regressed

with notable promptness Relief has lasted from several weeks to many months, some times longer It may prove of benefit in the presence of either sigmoidal rectal or anal involvement, with the probable identical therapeutic response At any rate, it would be worthy of trial in this phase of luetic involvement

LYMPHOGRANULOMA VENEREUM

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CHAPTER 14

Tuberculosis of Anus, Rectum and Sigmoid Colon

Tuberculosis of the anus and perianal region is usually a secondary manifestation of phthisis elsewhere in the body, yet primary infection is more frequent in and about the anus than it is within the rectum Tuberculous fistulae are considered elsewhere, see page 202

ETIOLOGY

Tuberculosis is the most frequent of the infectious granulomata occurring in the intestinal tract The *Myco tuberculosis* is the specific cause and reaches the sigmoid colon, rectum and anus by (1) the lymphatics—lymphogenous (2) the blood—hematogenous (3) direct extension from other structures (4) auto inoculation from sputa laden with the bacilli[77] or from contaminated thermometers, or (5) ingestion of diseased food such as milk Both the human and bovine types are found the latter being prevalent in children owing to the consumption of large quantities of milk[8, 6]

LABORATORY DIAGNOSIS

Briefly, the human *Myco tuberculosis* is a slender, slightly curved, rod shaped organism occurring singly or in group It is nonmotile Because of its waxy cell membrane, staining is difficult except by the most phenolized dyes, but when once stained it retains the color and is called acid fast The organisms may be identified by smears taken from the feces or ulcerated surfaces and stained by tissue section also by guinea pig inoculation and by cultivation

BACTERIOLOGY

Concentration Method Inasmuch as the *Myco tuberculosis* does not occur in large

Bacteriology	A Indirect—feces	Concentration method Ziehl Neelsen Guinea pig inoculation Cultivation
	B Direct—mucus scrapings particles pus	Ziehl Neelsen Guinea pig inoculation Cultivation
Histopathology		

numbers in feces it is necessary to concentrate the bacteria in the following manner Approximately 10 Gm of feces are placed in a sterile mortar to which is added a sterile solution of physiologic saline This is carefully ground with a pestle until the liquid becomes turbid It is then diluted with an equal volume of 6 per cent sulphuric acid, stoppered and permitted to stand for 30 minutes at 37° After light centrifugalization, the supernatant fluid is saved and again centrifugalized at high speed for 30 minutes The supernatant fluid is discarded and the remaining residue examined on a slide by direct microscopy The residue may be used also for guinea pig inoculation or for cultivation

Ziehl Neelsen[64, 93] This is employed almost routinely A thin suspension of the material is placed on a slide and covered with carbolfuchsin (basic fuchsin, sat alcohol soln 10 cc and phenol 5 per cent aq sol 90 cc) and steamed over a flame for 5 minutes The stain is renewed several times to prevent drying After washing with water it is decolorized with acid alcohol (conc hydrochloric acid 3 cc and 95 per cent alcohol 97 cc) It is washed with water and stained with methylene blue for from 10 to 30 seconds Finally it is washed with water and dried with blotting paper

Guinea Pig Inoculation The material having been diluted and macerated as described for the concentration method and the remaining residue drawn up in a syringe the inguinal regions on either side of the guinea pig are pinched in order to traumatize the underlying lymph nodes and the contents of the syringe injected subcutaneously (from ¼ to ½ cc) At the end of six weeks the animal is killed and examined for caseous nodules These are usually to be found in the liver lungs spleen and lymph nodes

Culture Method of Corper and Uyei[1] The residue from the previously described concentration method is made neutral with litmus by the addition to 10/N NaOH and seeded on the surface of glycerol water crystal violet, potato-cylinder medium The tube is capped with tinfoil and incubated at 37 5° for several weeks Growth may be noted as early as two weeks

Of interest are the reports by Kruger and Perlberg[4, 1] who are of the opinion that, because of the high percentage of false reports, the Woldman phenolphthalein test[91] is of little or no value They feel that the same is true of stool examinations

HISTOPATHOLOGIC EXAMINATION

This represents the most exact means of determining the tuberculous character of tissue and depends on the presence of tuberculous granulation tissues (fibroblasts, lymphocytes capillaries, fibrin) with the Langerhans type of giant cell and the characteristic tubercle formation with necrotic center, fibroblastic capsule and monocytic and lymphocytic infiltration In suspicious cases even though negative serial section of the tissue is essential The live granulation tissue is selected and obtained by scraping with knife or gauze This is then placed in a sterile beaker containing normal salt solution and sent to the laboratory for examination

To determine the presence or absence of tuberculosis is a most perplexing problem, especially when applied to the use of tuberculin Either it is inert in a large percentage of instances or there is considerable chance of falsely interpreting many reactions as positive The new standard tuberculin termed Purified Protein Derivative' (P P D) prepared by Seibert[79, 80, 81] and adopted by the National Tuberculosis Association is considered of greater value than O T[33, 44, 62] in that it is free of salts and nonspecific proteins and that its potency is reproducible With the assistance of Dr Gault, Pathologist to the Temple University School of Medicine 45 patients in our series were tested intradermally with P P D using the first dilution (0 00002 mg) Their reactions were read and measured in 48 hours The second dilution (0 005 mg) was injected in cases that were nega

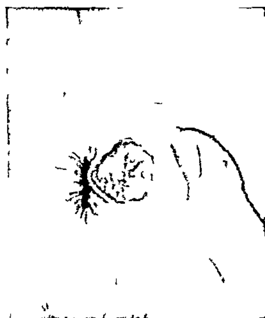


Fig 304 Large tuberculous ulcer, the edges of which are sharply defined The base is slightly elevated and uneven

tive to the first The results were as follows

Reaction	Number
Negative	33
Positive	
1 Reaction shows area of swelling measuring from 5 to 10 mm in diameter	1
2 Reaction shows area of swelling measuring from 10 to 22 mm in diameter	5
3 Reaction shows area of swelling exceeding 20 mm in diameter	3
4 Reaction shows area of swelling and definite necrosis	3
Total 12	45

Of the 12 cases showing a positive P P D test, eleven presented clinical and histologic evidence of tuberculosis

CLASSIFICATION OF TYPES AS TO LOCATION

Tuberculosis	Anal, Perianal	1 Ulcerative, 2 Verrucous, 3 Lupoid, 4 Miliary
	Rectal, Sigmoidal	1 Ulcerative, 2 Hyperplastic

Anal and Perianal Tuberculosis

Incidence Tuberculosis of the anal and perianal region is more frequently encountered in the male sex, by a ratio of 4 to 1[60] and is most common in young adults

Ulcerative Variety Pathology Frequently following some form of trauma the process begins insidiously as a small eleva



Fig 305 Section through wall showing small tubercle located just without the muscularis Note the giant cell and beginning caseation

tion or tubercle which breaks down to form a soft, shallow ulcer Occurring singly, the ulcer is rounded or oval in shape with a raw uneven, elevated, gray base dotted by yellow tubercles The edges are sharply defined, undermined and of a pale pink or bluish color Quite frequently a ring of raised induration giving a heaped up appearance is present around the ulcer (Fig 304) The discharge is foul smelling, thick and mucopurulent, but blood is small in amount Although initially discrete, tuberculous ulceration does not confine itself to a small area but gradually invades the adjacent perianal skin, frequently encircling the anus or spreading to the anal canal which at times is completely destroyed[4]

HISTOPATHOLOGY Usually the corium is infiltrated by mononuclear leukocytes, and there is evidence of fibrosis Areas of caseation are present together with tubercle formation and the presence of epithelioid cells lymphocytes and giant cells (Fig 305)

SYMPTOMS It is common for a patient with this condition to relate the occurrence of a small area of irritation following some form of trauma, which, although of little consequence refused to heal even after local treatment Tuberculous ulceration may cause pain especially when present in the anal canal and within grasp of the sphincter muscle it is the exception rather than the rule Weeping of the ulcer is a constant feature and while not excessive in amount is usually foul smelling

DIAGNOSIS A history of progressive anal ulceration which has failed to respond properly to local measures is suggestive of tuberculosis The presence of a painless ulcer with pale sharply defined edges and a raw elevated base spotted with yellow tubercles is almost pathognomonic (Fig 306) An absolute diagnosis however, can be made only after demonstration of the *Myco tuberculosis* by the methods previously described

DIFFERENTIAL DIAGNOSIS The distinguishing features of those conditions which may be confused with the ulcerative variety of perianal tuberculosis are tabulated in Table 32

Verrucous Variety Although comparatively rare, this form of anal tuberculosis is characterized by a warty or papillary

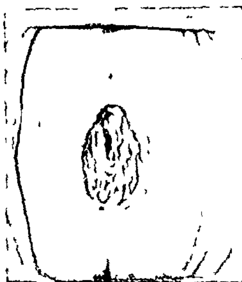


FIG 306 Extensive anal and perianal ulceration showing irregular and uneven base

excrescence The bovine type of the *Myco tuberculosis* is regarded as the cause

PATHOLOGY The process begins as a small plaque or wartlike papule which slowly increases in size and number By coalescence the lesion becomes scalloped or ovoid in outline definitely circumscribed, and brownish red in color, although the periphery is usually of a darker hue Covering the plaque are fine pointed vegetations which often are described as having a mammillated appearance [3] Ulceration occurs only occasionally nevertheless there is a discharge moderate in amount and foul smelling

SYMPTOMS Ordinarily the patient will complain of a burning sensation and an itching about the anus The presence of a teatlike elevation in itself quite painless is ofttimes cited as having existed for a period of time An abundant and foul discharge is frequently mentioned

DIAGNOSIS The diagnosis is made on the

TABLE 32 DIFFERENTIAL DIAGNOSIS

	TUBERCULOUS ANAL ULCERATION	ANAL CHANCROIDS	ANAL CHANCRE	FISSURE IN ANO
Characteristics				
History	T B elsewhere*	24 72 hours after intercourse	2 6 weeks after intercourse	Excruciating pain occurring at or following defecation
Pain	Not painful but tender	Marked	Slight if any	Definite pain interval pain severe
Discharge	Scanty thick yellow and foul	Profuse	Moderate	Slight in amount
Ulceration shape	Round or oval laterally placed	Circular or oval	Laterally placed circular or elliptical	Posterior midline at end below anorectal line longitudinal or itlike
Base	Shallow soft raw gray in color potted with yellow tubercles	Base granular	Indolent and gray	Reddish shallow and elastic if acute
Edges	Sharply defined undermined pale pink color	Sharply defined	Indurated and elevated	Elevated clean cut
Appearance	Moth eaten heaped up	Small macule then papule		
Number	Single*	Multiple	Single	Single
Inguinal involvement	Unilateral*	Unilateral	Bilateral	None
Laboratory	Tubercle bacilli in scrapings and feces tissue section shows typical histologic tubercles Tuberculin test positive	*B Ducrey* in smears	*Treponema pallidum* from chancre by darkfield positive Wassermann after 2 or 3 weeks	

* usually

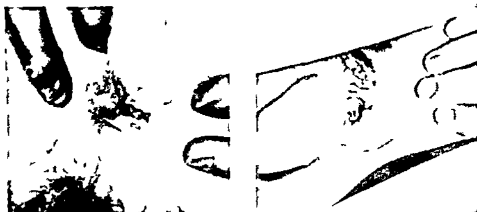
characteristics mentioned under pathology and by laboratory methods

Lupoid Variety PATHOLOGY Lupus of the anal region is likewise of rare occurrence and, although it may be primary is usually secondary to tuberculosis elsewhere While the infiltration retards the progress of the lesion eventually it is very destructive Occurring at the margin of the anus and arising in the corium, the process begins as a small round, elevated patch or nodule which is reddish brown and somewhat soft Quite insidiously the center breaks down to form an irregular clean cut ulcer having an indurated base covered with a mucopurulent discharge The diagnosis is made by (1) the nature of the lesion (2) demonstration of the *Myco tuberculosis* (3) tissue section and (4) guinea pig inoculation

Miliary Variety Miliary tuberculosis of the anus is extremely rare and represents an advanced stage of phthisis elsewhere Occurring at or below the intersphincteric line of the anus [1 59] it begins in the hair follicles or the sudoriferous or sebaceous glands of the skin, and develops as millet seed nodules beneath the epidermis Multiplication and coalescence ensue, so that by necrosis of the superimposed skin small cup shaped ulcers remain The bases are shallow and the edges ragged and indurated In the miliary variety the amount of purulent discharge is not excessive There is only a slight tendency to bleed, but the lesion is more sensitive than other types of anal tuberculosis The prognosis is always poor

DIAGNOSIS The diagnosis is made by the characteristics of the lesions by the demonstration of the *Myco tuberculosis* and by section of tissue In some cases the tuber

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(*Left*) R ( ]ge 37 Tuberculosis of anus Three distinct ulcers present in the lateral phases Tuberculosis evidenced by histopathologic and bacteriologic examinations (*Right*) M R Tuberculous ulcer noted in posterior quadrant

TABLE 33 DIFFERENTIAL DIAGNOSIS

	Verrucous Tuberculosis	Condyloma Latum	Condyloma Acuminatum	Epithelioma
Origin	Begins as a small plaque or wartlike papule	Begins as a flat elevation and becomes covered with macerated epithelium	Begins as a firm fragile wartlike elevation	Begins as a slight thickening or small firm nodular elevation
Characteristics Appearance	Warty or papillary excrescence scalloped in outline and definitely circumscribed brownish red mammillated and rough moth like	Broad flat warty elevation edges sharply defined rise at right angles to skin Tend to form large fungating masses fissures and excoriations common Usually no pain	Single or multiple projections or tufts springing from a single elongated pedicle No induration glistening and pale pink in color elevated edges	Nodular mass broad base indurated and fixed excess granulation tissue finally breaks down to form ulcer metastasis to inguinal lymph nodes
Number	At first single gradually increases in size and number	Single or in groups	Usually in groups	Single
Ulceration	Occasional	Frequent	Occasional	Crater like edges irregular raised and everted reddish violet broad base granular gray in color
Discharge	Moderate thick and foul smelling	Slight in amount and offensive	Slight in amount offensive	Slight in amount watery and irritating
Laboratory	Tubercle bacilli in scrapings Tissue section shows typical histologic tubercles of tuberculosis Tuberculin test positive	*Treponema pallidum* may be demonstrated in serum expressed from base of papules or from scrapings Wassermann Kahn and Kolmer tests positive		Biopsy positive

culin test may be employed successfully It should be remembered that in cutaneous tuberculosis the organism cannot always be demonstrated since at times it is destroyed soon after reaching the skin This is due probably to its allergic state[60] In each instance one should avail himself of every possible means to make a correct diagnosis

Treatment GENERAL In each case of anal tuberculosis the general treatment is of paramount importance and every effort should be made to improve the bodily resistance of the patient Change of climate and environment is often beneficial provided local treatment of the anal lesions is properly continued Plenty of rest is advisable In these cases the diet should be wholesome and high in caloric content The limitation of sodium chloride has proved of value in some cases[7 43] Supportive tonics may be used advantageously

Many methods of general treatment have been suggested among which may be mentioned the administration of new tuberculin beginning with 1 mg and increasing the dosage every second day and a combination of tuberculin and salvarsan

Much has been published regarding the newer drugs but, so far as tuberculosis is concerned, their use has not progressed beyond the experimental stage Promin, a

sulfone which was approved by the Federal Drugs Administration, is available in jelly form to be applied to external wounds of the skin, such as may occur around the anus and perianal region Experimentation with other sulfonamide preparations has tempered early enthusiasm Penicillin appears to offer no effect on tuberculosis, according to Kolmer[49] Any conjecture regarding the clinical potentialities of streptomycin seems to be unwise at this time, although in their experiments on animals, Feldman *et al*[30] concluded that streptomycin exerted a suppressive rather than a sterilizing effect on the infective agent that it was effective in resolving or suppressing established experimental tuberculosis in guinea pigs and that in approximately 39 per cent of their cases this preparation resulted in a reversal of a positive to a negative sensitivity to tuberculin Streptothricin appears to be devoid of antituberculosis effects[49]

The local application of hydrogen peroxide and sodium iodide by mouth has received favorable comment[8] Marino recommends the use of zinc peroxide paste

Anal hygiene is an important factor Topical applications of silver nitrate, 10 per cent solution, parathiocresol, 50 per cent gentian violet, 2 per cent balsam of Peru and argyrol, 20 per cent, may prove of value in some cases Saturated solution of sodium phenate, and trichloracetic acid[4] have been employed effectively Insufflations of chalk and potassium iodide, equal parts, have been advocated[83] Pyrogallol ointment, 20 per cent and arsenic plaster have also been recommended[43] For the relief of an associated pruritus, Mechling[60] suggested the following

℞

Anesthe in	g xxv
Lanolin	qs oz 1

Sig Apply locally

Quartz mercury light has been used successfully in a large group of cases Treatments are given twice or thrice weekly Werner[90] begins with three minutes at a distance of thirty inches and increases the exposure one minute at each subsequent treatment given every other day This form



FIG 307 Tuberculosis cutis originating from a tuberculous sinus (Ormsby s ' Diseases of the Skin," Philadelphia Lea)

of therapy is especially useful in healing the wound following excision of the ulcer. According to many,[3, 37, 68] phototherapy by means of the Finsen light offers better results in lupus than any form of treatment thus far instituted. Carbon arc light bath, applied thrice weekly for a period of from one to two hours, has proved successful in some cases.[40, 8] Yeomans reports excellent effects with therapeutic doses of the roentgen ray using from one fourth to three fourths of an erythema dose at intervals of two to three weeks. Others have observed similar results.[68]

SURGICAL. From a surgical viewpoint these patients must be treated with full realization that the disease is a systemic one. Any operative procedure, therefore, should be performed as conservatively and with as little shock as is possible. In this the choice of anesthesia and the use of the cautery or endotherm are of utmost importance. Intradural, sacrocaudal or infiltration analgesia avoids the aggravating effects on the pulmonary lesion encountered when the inhalation method of general anesthesia is employed. The application of the red hot cautery to the lesion or ulcer base has been rewarded by good results. As has been shown experimentally,[5, 97] dissemination by means of the blood vessels and lymphatics is prevented, fibrous tissue is stimulated and young blood vessels are formed where the cautery is used. So far as the time of operation is concerned, in some cases it is advisable to postpone the procedure until the general health of the patient has improved.

Excision. The base of the ulcer is infiltrated with procaine solution 1 per cent and the edges are grasped with toothed hemostats. The entire ulcer is then excised by means of scissors but preferably the endotherm. With the latter bleeding is minimized and the lymphatics are sealed, which prevents dissemination. The overhanging edges are removed and exuberant granulations curetted away. Finally the wound is painted with a mild antiseptic solution, petroleum jelly gauze is applied and sterile dressings are held in place by a T binder. The postoperative care consists of local cleansing each day and painting the wound with balsam of Peru. Silver nitrate, from 5 to 10 per cent, may be used every second day to stimulate granulation. Subsequently the quartz mercury light is employed. In the lupoid and verrucous types, excision is ordinarily the method of choice. In cases where the tuberculous process develops progressively in spite of all treatment until a cicatricial closure of the anus is threatened, a temporary colostomy is indicated. This offers the added advantage of relieving the ulcerated area from the constant irritation of rectal discharges, thereby giving it a better chance to heal.

PROCTITIS AND SIGMOIDITIS

Intestinal tuberculosis is generally considered a rare entity and this is true except in various sanitoria. Goldberg and Smithies,[31] for example, reported a series of adult patients who died of tuberculosis in whom 80 per cent showed intestinal involvement. More recently Kruger and Perlberg[40] found intestinal tuberculosis occurring in from 60 to 80 per cent of patients reaching autopsy. *Beidert*[9] *noted* an incidence of 31.6 per cent in a series of 1,346 children with tuberculosis, whereas Bollinger[10] found tuberculous lesions *in from* 30 to 40 per cent of his group of tuberculous children.

Tuberculosis of the sigmoid colon and rectum is usually secondary to phthisis elsewhere, generally the lungs.[11, 18, 33, 71, 73] It has been mentioned that the rectum is involved in approximately 14 per cent[33, 73] and the sigmoid in 13 per cent[31] of cases of intestinal tuberculosis. When present it is usually either secondary to or simultaneous with involvement of the upper colon.

C. L. Martin[46] has tabulated the incidence of tuberculous ulcer at various levels in the intestinal tract as follows:

	Fenwick and Dodwell		Goldberg Sweany Brown Martin
	Incidence Per Cent	Incidence as Sole Intestinal Lesion Per Cent	Incidence Per Cent
Duodenum	3 4	0	3 8
Jejunum	28 0	1 4	21 2
Ileum	60 2	4 4	83 2
Cecum			87 0
Ascending Colon	51 4	1 8	
Transverse Colon	30 6	1 0	
Descending Colon	21 0	0	
Colon			71 0
Sigmoid	13 5	0	16 3
Rectum	14 1	0	16.3

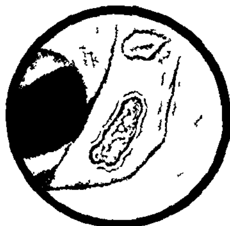


Fig 308 Tuberculous ulceration of rectum The edges are sharply defined, undermined and slightly elevated



Fig 309 Tuberculous ulceration of rectum Arrows point to the ulcers, half head arrows point to macroscopic tubercles A wooden stick has been inserted in an opening in the base of an ulcer which communicated with the peritoneal cavity

Either of two types may affect the rectum and sigmoid, (1) the ulcerative or (2) the hyperplastic

Ulcerative Tuberculosis Pathology Both varieties of intestinal tuberculosis have their sites of predilection in the ileocecal coil, whence the infection extends caudally to involve the sigmoid and rectum The process begins in the lymphoid tissue of the submucosa where the *Myco tuberculosis* multiplies with the formation of tubercles These tubercles, which at first measure from one to four millimeters in diameter, coalesce and become larger to form small, nodular elevations on the surface of the mucosa The number of these hyperplastic elevations depends on the duration and activity of the disease [57] Caseation necrosis occurs and these little nodules break down to form ulcers Typical ulcers are moderately large and appear round, oval or elliptical in shape with a dirty, gray, elevated base dotted by yellow tubercles (Fig 308) Ordinarily the edges are gnawed, everted and undermined These ulcers tend to coalesce, forming one or more larger ulcers which appear to follow the blood vessels and lymphatics [16 47] This is especially true in the upper rectal ampulla and sigmoid As a rule there is but little thickening of the bowel wall although the inflammatory process may extend beneath the mucosa by way of the submucosa lymphatic network and through the muscular layer into the perirectal tissues causing abscesses and fistulae (Fig 166) Martin,[63]



Fig 310 (*Left*) Proctoscopic view of a tuberculous process Nodular elevations and ragged ulcerations are noted (*Right*) Tenting of the muscle loss of the normal haustral outline Numerous craterlike areas with barium clinging to the margin of the ulcer are seen Irritability and spasticity are noted

TABLE 34 DIFFERENTIAL DIAGNOSIS

	TUBERCULOUS ULCERATION	ULCERATIVE COLITIS	AMEBIC DYSENTERY
Etiology	Secondary to T B elsewhere	Primary disease	Primary disease
History	Disease becomes progressively worse	Characterized by exacerbations and periods of remission	May be acute infection with short duration Usually respond favorably to treatment
Appearance	Ulcers are irregular and have gray worm eaten base with slightly thickened ragged and undermined edges Base covered with mucopurulent discharge—later with dirty gray inseparable slough Surrounding mucosa is inflamed and edematous	Begins as simple chronic inflammation Then diffuse miliary abscesses develop whose rupture gives characteristic superficial ulcers Large ulcers develop through confluence of smaller ones Base may be gray and necrotic or fresh and hemorrhagic	Begins as low grade inflammatory reaction discrete ulcers in various stages of development Milletseed sized elevations with a pearl gray center and reddish periphery followed by round or oval ulcers with rather firm elevated borders which are undermined
	Spreads by degeneration of edges and coalescence	Spreads by confluence of ulcers	Spreads by confluence of ulcers
Bleeding	Usually slight tinging the discharge	Blood in stool Also pus and mucus	Stools contain blood tinged mucus
Discharge	If ulceration is limited discharge is scant mucopurulent blood tinged and with a fetid odor If it is extensive discharge is abundant and thin	Discharge is mixed with stool along with pus and mucus Usually it is not fetid	May or may not be purulent discharge
Tenesmus	Bowel movements usually accompanied by tenesmus	During exacerbations of the disease tenesmus usually accompanies bowel movements	Griping and tenesmus usually are present
Pain	Colicky pains accompany the diarrhea	Colicky pains may be independent of the stools	Griping pains with bowel movements
Diarrhea	Increase with disease up to 20 30 daily	3 20 stools daily If disease is limited to rectum patient may be constipated	Stools number up to 15 daily
Laboratory	*Myco tuberculosis* in scraping from ulcers	Bargen diplostreptococcus may be found	*Endamoeba histolytica* isolated



FIG 311 Tuberculous ulcers of bowel (C L Martin)

whose opinion on this subject is authoritative describes the pathologic sequence as follows hyperemia, edema follicular lymphoid hyperplasia, ulceration hemorrhage, perforation or healing If perforation occurs above the peritoneal reflection peritonitis ensues As a result of healing brought about by the chronic productive exudate, a diminution in the caliber of the lumen may occur Occasionally in tuberculosis of the bowel an organic stricture forms due to subsequent contraction of the fibrous tissue deposited[3, 60] This is especially true where the ulcerations have extended circularly about the gut[37, 81] The serosa is reddened and thickened and upon its surface are noted layers of fibrin which cause the gut to be adherent to the mesentery or other loops of the intestines

SYMPTOMS The symptoms of tuberculous proctosigmoiditis vary with the degree of ulceration Discomfort or uneasiness in the rectum and a looseness of the bowels are common symptoms In some cases a history of constipation is related by the patient which may or may not alternate with diarrhea,[27] but usually, and especially later in the disease, a progressive diarrhea manifests itself The character of the stools is watery foul smelling and mixed with pus and blood The latter is not profuse in amount and varies in color from bright red to black Tenesmus is usually present where the lower rectum is involved Not infrequently during the course of the disease the patient complains of pain over the lower abdomen or sacral region Various disturbances, such as loss of appetite nausea, flatulence (termed by Alvarez[1] "reverse gradient" or reverse peristalsis), night sweats, irritability weakness, fever and loss of weight may be experienced

DIAGNOSIS A history of pulmonary tuberculosis with the symptoms enumerated above is suggestive of lower intestinal involvement As Stewart[86] remarks "When a tuberculosis patient, usually placid begins to be irritable, nervous and querulous, it is time to think of intestinal ulceration Not infrequently the general appearance of the individual will prove of assistance but in all cases the physician should untiringly seek by all available means, to make a correct diagnosis On digital examination the edges of the ulcers feel elevated and undermined while their bases are shallow and firm On proctosigmoidoscopy the presence of yellow nodular elevations and elliptic ulcers will help to establish the diagnosis The edges of these ulcers are elevated and ragged whereas the bases appear bulging

gray in color and dotted with yellow tubercles (Fig 310) In the few cases observed, the abdomen was more or less scaphoid and palpation elicited considerable discomfort In two instances the outline of the sigmoid and descending colon could be palpated Cord or pipelike would probably be a descriptive term Variations in temperature lymphocytosis and increased sedimentation of the erythrocytes are usually noted

Roentgenography and fluoroscopy following a bariumized enema will prove informative when lesions occur in the upper rectum and colon (Fig 310) Although predominating in the ileocecal coil a marked degree of spasm and obliteration of the haustra may be visualized in other portions of the colon[19] According to Brown[13] the detection of the lesions is based on physiologic rather than pathologic changes

An absolute diagnosis is made only by laboratory means As previously mentioned examination of scrapings from the rectal ulcer and serial sections of the tissue are the best and the most widely used procedures Kruger and Perlberg[6, 1] found that from four and one half to six per cent of their 800 patients with intestinal tuberculosis had sputa which were microscopically negative Guinea pig inoculation was negative also They are of the belief that a patient with an arrested pulmonic tuberculosis or who has an effective collapse and begins to show a decline in his weight curve or appetite should be suspected of intestinal involvement

Differential Diagnosis Ulcerative tuberculous proctocolitis is to be differentiated from the amebic and chronic ulcerative varieties as shown in Table 34 page 435 For the distinguishing features of other types such as the bacillary syphilitic and gonococcic the reader is referred to Chapter 9 page 282

Complications and Sequelae Abscess and fistula are frequently associated with tuberculosis of the rectum Quite characteristic of this type of abscess is its insidiousness and painlessness with but little inflammatory reaction Following rupture through the skin or after incision, a thin watery pus exudes which differs from the thick purulent discharge of an ordinary pyogenic abscess The opinion has been expressed that in tuberculous patients 90 per cent of perirectal abscesses and fistulae can be proved tuberculous by laboratory methods[29] Pruritus ani is not an uncommon sequela to acid fast infection in this part of the intestinal tract Stricture formation is of more serious import but fortunately is infrequent[23] Cases have been reported[10, 4, 63, 80] in which the epithelium around the margin of a tuberculous ulcer has proliferated and undergone malignant degeneration but this is of rare occurrence



Fig 312 Tuberculous ulcers of rectum sigmoid and descending colon (C L Martin)

Treatment The general treatment in these cases consists of a nutritious diet, fresh air sunshine, plenty of rest and supportive tonics For diarrhea the fluids

should be limited The subnitrate, sub carbonate or salicylate of bismuth, gr x to xx, or zinc sulfocarbolate, gr ii, may be given every 3 or 4 hours as indicated The fluid extract of catechu, Mi to xxx tinc ture of kino, drachm ½ to ii, tincture opii camphorata (paregoric), drachm ½ to i, or chalk mixture (mistura Cretae), drachm ½ to oz i, may be substituted Drop doses of *creosote in a capsule, with ¼ gr of* iodoform, after meals, has been suggested[14] Calcium chloride given intravenously in doses of from 5 to 10 cc of a 5 per cent solution has been found useful Recently we have been using calcium gluconate in the same dosage and percentage with en couraging results Bleeding is usually slight and may be controlled by giving the sub gallate of bismuth, gr x to xx, every 4 hours Tannic acid, which is a powerful astringent, may be employed in doses of from 1 to 15 grains Most helpful in these cases, however, are the injections into the rectum of starch water, silver nitrate, 1 to 3 000 or tannic acid, 1 to 1 000 Irrigations of physiologic salt solution, 110° F, or plain water are beneficial in cleansing the bowel and lessening the diarrhea Instilla tions of stovarsol methylene blue 1 per cent, or hexylresorcinol, 25 per cent, are soothing to the mucous membrane and offer comfort to the patient For relieving tenesmus, hot olive oil from 1 to 2 ounces may be instilled night and morning Locally the ulcerated areas are treated through the sigmoidoscope with silver nitrate, from 5 to 10 per cent solution, balsam of Peru or ichthyol, 25 per cent As an adjunct in sufflations of a powder such as bismuth and calomel equal parts thymol iodide, or ortho form may prove of value Heliotherapy using the quartz mercury vapor lamp and roentgen ray treatment have proved most helpful in these cases[28] Some authorities have eliminated bismuth salts especially where x rays are used, due to the salts absorbing bet i irradiation with harmful results Care should be taken in prescribing them

Surgical Treatment Our experience with this variety of intestinal tuberculosis has been extremely limited Of six proved cases, two expired while hospitalized, two were enterostomized (one ileostomy and one transverse colostomy) with one death and two were resected with one death

Lockhart Mummery[57] tabulates the con traindications to operation as follows

1 Extensive pulmonary tuberculosis with high temperature
2 Marked albuminuria
3 Severe diarrhea showing the presence of marked ulceration

The results of his surgical cases are re ported herewith

Operation	No Cases	Recov ered	Died	Mortality Per Cent
Resection	63	47	16	25 4
Short Circuiting	16	13	3	18 7
Exclusion with Colostomy	7	1	6	85
Exclusion with Lateral Anastomosis	3	1	2	66
Total	89	67	27	

Hyperplastic Tuberculosis Hyperplas tic tuberculosis, also termed hypertrophic neoplastic or scirrhous, may be caused by either the human or the bovine *bacillus* and differs from the ulcerative type in that it is always chronic[34] By some[11 31] it is generally considered to be a primary infec tion In a series of 100 cases tabulated by Brown and Sampson, 76 were found to be primary Accordingly, this variety is less frequently associated with pulmonary tu berculosis than the ulcerative form[3] It is prone to occur in young adults and is rarely observed after forty[1] *Tuberculosis of the* hyperplastic variety is uncommon in the sigmoid and rectum although instances have been reported[6 7 15 – 4 3 39 44 47 – 53 54 56 61 71 3]

Pathology The process begins in the submucosa, but usually both the mucous membrane and the muscular layers are in volved As a result of the hyperplasia pro duced, the wall of the rectum insidiously

TABLE 35 DIFFERENTIAL DIAGNOSIS

	Hyperplastic Tuberculosis	Stricture	Malignancy
Age	20 30	20-40	35 60
Race	White and colored	Colored	White
Sex	Males	Females	Females
Onset	Insidious	Insidious	More rapid
Symptoms			
History of	Upper intestinal complaints	Some previous pelvic inflammatory disease	Change in bowel habit
Blood and pus	Rare	Always	Frequent
Constipation Diarrhea	Diarrhea most frequent	Dribbling diarrhea	Constipation later diarrhea
Pain	Constant feature most marked usually over right lower quadrant	Bearing down sensation rather than frank pain	Late manifestation
Findings			
Appearance	Pale and dry	Uniform narrowing of entire circumference	Proliferating growth or excavating ulcer
Palpation	*Thick and rigid*	*Firm inelastic*	Hard nodular mass fixed confined more to one side than the other Tends to grow rapidly
Laboratory			
a *Intradermal test*	*Tuberculin positive*	Frei positive	
b Stools	Tubercle bacilli occasionally		
c Biopsy of tissue	Miliary tubercles	Not characteristic	Positive for malignancy
d *Guinea pig inoculations*	*Shows T B*		
Complications and sequelae			
abscess and fistulae	Occasional	Very frequent	Less common
obstruction	Late manifestation	Occurs late partial frequently *complete infrequently*	Early and frequent

becomes enormously thickened and rigid to which phenomenon the name gas pipe colon is applied[64] Occasionally the granulation tissue is localized and conforms to a mass which is termed 'tuberculoma' This may be single or multiple firm, smooth quite movable and sharply defined so that not infrequently this condition is mistaken for a malignant growth

According to Coplin[70] ulceration of the mucosa is relatively uncommon Stewart[87] considers the disease process essentially a proliferative one with secondary infection and concurrent ulceration superimposed Of the 21 cases reported by Martin[?] 18 were histologically tuberculosis two showed tubercle follicles in the associated lymph glands and one of them was entirely negative

SYMPTOMS Initially the patient offers a history of various constitutional disturbances, such as loss of appetite, weakness and decrease in weight but as the disease progresses over a period of perhaps many months, diarrhea at times alternating with constipation has developed At this stage the stools are often watery, and if ulceration is present, are mixed with pus and blood A sense of weight or fullness in the rectum, and tenesmus are often experienced Abdominal pain is a most constant feature of hyperplastic tuberculosis and is usually due to varying degrees of obstruction which, in these cases is not infrequent[70, ?]

DIAGNOSIS On digital examination the

rectum feels thickened and quite rigid, whereas sigmoidoscopy reveals the mucosa as dry, pale and inelastic The surface may appear cracked, with tiny spots of blood, but definite ulceration is uncommon To determine involvement above the rectum, the roentgen ray and fluoroscopy following an opaque enema are of diagnostic value, as shown by hypermotility and irritability, as well as interruption by the contrast method Although the *Myco tuberculosis* is less frequently isolated in this variety, the procedure before mentioned will serve to verify the diagnosis

DIFFERENTIAL DIAGNOSIS Hyperplastic tuberculosis is most frequently confused with malignancy and stricture Table 35 will assist in differentiating the more important points

TREATMENT The general management as outlined under the ulcerative variety may be applied to this type of lower intestinal tuberculosis So far as surgical intervention is concerned, various writers [41 61 7] consider resection the operation of choice, although ileostomy, which may be readily performed under local analgesia, is advocated in selected cases [15 71] Rankin[7 3] and Comfort report a series of 50 resections following ileocolostomy and ileosigmoidostomy with a mortality of 8 per cent All cases were confined to the right and transverse colon, however Hayden[39] cites a group of 12 operations with but one death as follows

HAYDEN S SERIES	
Abdominoperineal re ection	1
Right colectomy with lateral ileo transverse colostomy	6
Ileo transverse colo tomy only	1
Ileosigmoidostomy	1
Biopsy of sinuses persi ting 13 yrs after appendectomy	1
Biopsy of me enteric lymph nodes and appendectomy	2
	12

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CHAPTER 15

Actinomycosis of the Anorectum

INCIDENCE
ETIOLOGY
PATHOLOGY
SYMPTOMS
DIAGNOSIS
DIFFERENTIAL DIAGNOSIS
PROGNOSIS
TREATMENT

Actinomycosis of the anorectum as an entity is rarely encountered However, its occurrence in cervical, fascial, thoracic and abdominal areas is not infrequently reported This is because more careful diagnostic studies have revealed its presence We are cognizant of the fact that the anorectal phase of this disease may occur more frequently than is at present recognized

INCIDENCE

The incidence of actinomycosis of the anorectal region is difficult to estimate The number of cases of actinomycosis reported from all sources has been gradually rising during the past two decades This is due to its recent widespread recognition as the result of the increased sagacity of our clinicians which opinion is noted by Cope[13] and supported by the work of Sanford[4] The apparent regional distribution in this country and France may be due to more accurate diagnosis and not to an actual increase of actinomycosis in these areas Auspaugh[1] observes that most of the cases in this country are reported from the Mississippi Valley and the northeast states where there is an increased familiarity with the disease In France it is most commonly noted in the region about the city of Lyons where a systematic search is routinely made for it

Illich[23] reviewed 421 cases of actinomycosis in 1892, none of which affected the anorectal area Poncet and Berard[40] in their treatise reported but seven examples However, a few years later Thevenot[1] mentioned 15 cases Bensaude[6] cited five cases of anorectal actinomycosis Other French writers such as Wehr[8] and Lecene[30] have reported single cases In the United States Sanford and Voelker[46] collected a series of 670 cases of actinomycosis for analysis, five cases involved the perirectal region Attestation of the rarity of this condition is revealed by the fact that many writers make no mention of it in their texts[1 33 4] Tuttle[54] and Gant[18] give brief reference to it, whereas Yeomans[60] reported two cases with extensive discussion, and Buie[13] reviews in detail a case of actinomycosis of the anus and rectum

Actinomycosis is more common in men than in women Sanford and Voelker[46] noted that 80 per cent of their cases studied were men and the median age incidence fell between 20 and 30 years This is supported by the early work of Delbet and Cherassu[14] Steenrod[50] points out that mouth hygiene is better in women and hence may be a factor in its predominance in the male Hayden[1] cites a survey made at the Massachusetts General Hospital from 1900 to 1935 in which 113 cases of actinomycosis were found only one involved the buttocks, however

Historical Bollinger[10] in 1877, described a granulomatous formation with the occurrence of branching mycelia in the debris material obtained from the diseased jaws and throats of cattle The debris contained yellow granular bodies from which a fungus was isolated He considered them to be the causative agents of this condition Harz[70]

examined Bollinger's specimens and found portions of the mycelial elements of an organism which he called a "ray fungus" or actinomycosis In 1879, Israel[1] isolated a fungus in man from a chronic empyema similar to that discovered by Bollinger Ponfick[41] recognized the disease clinically Israel (1884) and Bostroem[9] soon after found the fungus to be aerobic, but, in 1891, Wolff[9] and James Israel showed the cultures of *Actinomyces bovis* to be anaerobic, and careful studies of the etiology and pathogenesis were conducted

ETIOLOGY

Mode of Infection in Man The mode of infection in man is a moot question It may be said that the organism gains entrance to the body through grasses and grains, as evidenced by the finding of barley in lesions[1] There is little evidence to show that the disease can be transmitted by contact from animal to man or from man to animal However, it may be endemic among cattle fed in certain fields of grain[1] Neuber[3] was able to culture the anaerobic strains from living patients, while the postmortem material disclosed the aerobic variety That *Actinomyces bovis* may live aerobically on grasses and anaerobically in the tissues of man may be concluded

Lord Trevett[3-] and Emmons[10] have isolated organisms from the normal mouths of man From the study of smears made from the contents of carious teeth and tonsillar crypts, organisms having the morphology and staining reactions of actinomycetes were found[31 40] Macnab[34] suggests that associated organisms may produce anaerobic conditions essential for *Actinomyces* to thrive Colebrook[1] described the actinobacillus actinomycetem comitans[73] as such an organism Wangensteen[6] believes that the concomitant bacterial invaders aid in producing the regional anaerobiases for the growth of the *Actinomyces* by reducing the oxygen potential of the tissue

Since we are primarily interested in the mode of infection that occurs in anorectal actinomycosis, we may conclude that the organism is present in the oral cavity or admitted therein from external sources As it migrates by way of the intestinal tract to regions such as the cecum or rectum, where stasis occurs, it may well find the necessary portal of entry to establish itself In the case of the rectal area it may enter an abrasion in the perianal skin or an infected crypt or ulcer The rectal area may also be infected by the use of grass, straw or hay as a means of cleansing the anorectum

PATHOLOGY

The ray fungus, *Actinomyces bovis* on invasion of the tissues involved goes through an undetermined incubation period[70] The reaction due to the infection begins in the subcutaneous or submucous connective tissue of the anorectum A granulomatous type of reaction in which the feature of an acute as well as a chronic type of infection may be noted coincidentally The organisms may occur as diffused mycelia or collected in the characteristic granules Surrounding the organisms or granules is a marked cellular activity which is characterized by the presence of large numbers of polymorphonuclear leukocytes, small, round cells, and mononuclear cells The fibroblastic reaction in the periphery is much greater than is seen with other common granulomata and the vascularity is increased by a rich network of young blood vessels which remain intact, as compared with the endarteritis typical of tuberculous and syphilitic lesions

Marked induration is soon noted, to be followed by necrosis of the overlying skin, abscess formation, multiple sinuses and burrowing pus channels filled with a seropurulent discharge containing the sulfur granules This discharge may vary from gray to green and yellow in color

The fibroblastic reaction surrounding this process is an attempt on the part of the body to wall off and localize the area of necrosis and liquefaction[38] This brawny or "wooden" induration is observed clinically in cases of actinomycosis It is afforded by the cartilaginous like proliferation of con

nective tissue, followed by softening and pus formation over a period of weeks or months. The color of the skin suggests a remarkable vascularity which is always demonstrated at operation [70]

The actinomyces are nonmobile but may be carried into the adjacent tissue by macrophages. There is no evidence that the organism permeates the lymphatics. The spread of actinomycosis is by direct invasion and tends to proceed beneath and not across epithelial barriers,[79] although it is possible for the organisms to erode a blood vessel and thus become a metastatic focus in other organs. Northrup and Crowley[31] obtained a pure culture of actinomycosis from the blood stream following exodontia. Muscle cartilage and bone may be destroyed in the path of the disease [3] Steenrod [0] reports a case of anorectal actinomycosis that involved the sacrum and suggested that the resulting osteomyelitis was the aftermath of secondary infection.



FIG 313 Histopathologic evidence of actinomycosis in a case of pilonidal sinus (H R Reichman)

SYMPTOMS

The symptoms of anorectal actinomycosis may be acute or chronic and local or systemic. The acute phase of the disease is rarely recognized due to the insidious onset, and, as a result the condition is not diagnosed until a chronic process has well established itself.

The local manifestations are characterized by the appearance of a small, indurated furuncle like lesion in the perirectal area gluteal furrow or buttocks. Not infrequently it may be mistaken for a "boil". Ordinarily it is not unduly painful. The lesion may rupture and drain pus intermittently. The discharge is commonly a flaky yellowish white color with an earthy smell while the skin over and about the area is sometimes reddish brown in color. As the disease progresses fistulae may become extensive over the anus and buttocks and their tortuous tracts may be traced into the rectum. The lesion may deepen by extension so as to involve the prostate and corpora cavernosa. The disease may be present for years, during which time swelling occurs, followed by ulceration, discharge and then quiescence of the process. Painful defecation may be experienced early.

The general or systemic symptoms may be weakness malaise fever, loss of weight abdominal pain nausea, vomiting and diarrhea. Severe anemias may develop during the chronic phase of the process. Descending forms of the disease may produce an abscess, fistula and even stricture.

Thevenot has been impressed with the frequent association of nervous phenomena thought to be due to a toxin secreted by actinomycosis.

In 1933, Bensaude described four phases of anorectal actinomycosis (1) proctitis accompanied by fever, abdominal cramps and diarrhea or constipation (2) a woody infiltration (3) abscess formation with fistulae and the complications such as (a) those which occur in situ, mul

tiple fistulae and abscesses which may form cavities and stenosis of the anus or rectum, (b) those that occur by continuity, such as involvement of the pelvic viscera, (c) those that occur at distances, such as abscesses of the liver and septicemia

DIAGNOSIS

A history of draining sinuses and fistula, preceded in some instances by systemic symptoms, should arouse suspicion of anorectal actinomycosis On examination, abscess formation with sinuses as well as fistulae may be apparent outside as well as within the rectum A positive diagnosis is made by demonstration of the sulfur granules and typical branching mycelia in the purulent material and tissue The Macnab technic is as follows The pus is collected in a test tube and strained through gauze The granules thus obtained are placed on a glass slide with a drop of sodium hydroxide solution If a Gram stain is employed, a gram positive mycelia is noted As an alternative, the pus may be centrifuged and the sediment embedded in wax The sections are then stained with hematoxylin and eosin Microscopic examination reveals the mycelium with its radially arranged, club shaped filaments Specimens obtained by curettage or sections of the invaded tissue may also be embedded in wax and stained However, sections of the tissue rarely show granules and the mycelium seldom reveals club formation Secondary infection makes isolation of the ray fungus difficult and culture nearly impossible Successful culturing of the organisms is obtained in recent lesions incised for the first time with a minimum of secondary invaders

DIFFERENTIAL DIAGNOSIS

Anal lesions simulating actinomycosis include nonspecific fistula, benign stricture tuberculosis, syphilis, carcinoma, sarcoma amebic infection and lymphogranuloma venereum In the case of tuberculosis search for the disease elsewhere, employing examination by bacteriologic and histopathologic methods (see p 426) Amebic dysentery may be diagnosed by a demonstration of the *Amoeba histolytica* (see p 268) Lymphogranuloma venereum by a positive Frei test and histologic study (see p 355)

PROGNOSIS

The prognosis in anorectal actinomycosis must be guarded Various authors[7, 10, 6] have reported cases treated with a combination of surgery, penicillin and sulfonamides with increased success over various types of treatment previously instituted

Death from actinomycosis is usually due to dissemination of the mycotic process,[13] amyloid degeneration[11] or septicemia as a result of secondary infection

TREATMENT

Anorectal actinomycosis that has been successfully treated has responded to a *combination of therapy* The therapeutic measures that make up the armamentarium to arrest the disease are surgery, vaccines irradiations and, more recently, the sulfonamides and penicillin

Surgical treatment was first successfully instituted by Waring [7] in 1905 He writes ' The limits of surgery appear to be incision, evacuation, scraping, draining of abscesses as soon as they can be diagnosed ' Smith[18] pointed out the importance of scrupulous wound hygiene Wangensteen,[4] in 1936, remarked, ' The most direct agency in the treatment of actinomycosis is surgery the rationale of the surgical treatment lies in the fact that the infection is essentially an anaerobic one removal of the dead tissue, which is poorly oxygenated and is in consequence an excellent culture medium, will usually terminate the disease " He advises removal of dead tissue by repeated curettage Complete surgical excision is by far the best procedure, providing the lesion is sufficiently localized However, there are cases in which radical measures are not feasible, due to the danger of spreading the organisms to other parts of the body In such instances ample

drainage should be provided by incision and the sinus tracts freely and thoroughly curetted Brickner[9] advocated the local application of Lugol s solution, following surgical treatment When using this solution, it is important to protect the skin around the sinuses with petroleum jelly gauze Steenrod suggests irrigation of the sinuses with hydrogen peroxide previous to the application of Lugol s solution

Potassium iodide has been used empirically for the treatment of actinomycosis since 1885 Itterson and Netter[6] introduced this drug for treatment of humans after it had been shown to be of benefit in lingual actinomycosis of cattle by Thomassen[1], from 60 to 90 gr thrice daily was the usual dose Although the drug is still used extensively, it is the opinion of Colebrook,[11] Jungling[3] and Wangensteen[6] that its use is not warranted



Fig 314 Photomicrograph of tissue excised from an actinomycotic granuloma of the ischiorectal fossa A sulfur grain body, or actinomyces, is demonstrated (Dr Caleb H Smith)

Roentgen and radium therapy is particularly effective in circumscribed superficial anorectal actinomycosis[47] Its effectiveness in the more widespread forms of the disease is not impressive The use of vaccines has had its proponents Colebrook[12] and Neuber[3] have been its strongest adherents and have produced impressive statistical data to substantiate their findings

The most recent attempts of treatment have been with the use of the sulfonamides

and penicillin The results obtained with sulfanilamide, sulfapyridine and sulfadiazine in cases of actinomycosis have been gratifying[5 7 1 3 5] From present reports there is no doubt that these drugs are effective adjuncts in treatment

Numerous reports regarding the use of penicillin[4 ...] have been recorded in the recent literature and in conjunction with surgery It appears that certain strains of the organism are more resistant than others Certainly its use is worthy of trial

An interesting, previously unreported case of actinomycosis of the anorectum encountered by my colleague and former associate, Dr Caleb H Smith, is cited as follows

Mrs L N a white housewife, aged 45 years was first seen on December 27, 1943 She complained of a growth beside her rectum' of four months duration During the past two weeks the lesion had become painful particularly while she was walking There had been no bleeding, protrusion, discharge or change in bowel habit The general medical history, past history and family history were irrelevant

On examination her temperature was 98 0 her pulse 90 and her blood pressure 132/80 There was a tender, hard mass involving the left anterior perianal area The skin covering the lesion was not red or excessively warm

The tentative diagnosis was an ischiorectal infection which had not become well localized The patient was instructed to take sitz baths three times daily, to keep her stools soft and to cleanse her anus carefully

After two weeks the patient returned The pain had persisted and was so severe that she demanded operation On examination the findings were unchanged, there was no evidence of further localization and abscess formation

On January 12, 1944, under caudal and transsacral block with procaine hydrochloride, the indurated area was incised Since there was no liquefaction of the lesion, the mass was excised The process was traced to an infected crypt The entire tract was excised The external sphincter was divided at right angles to the course of the muscle fibers The edges of the wound were saucerized The wound was packed for 24 hours with gauze impregnated with zinc peroxide

The pathologist reported a chronic inflammatory process in which were found th sulfur grain' bodies or actinomyces

The patient was given sulfadiazine, 1 0 Gm every four hours for one week and then 1 0 Gm every six hours for two months She continued her daily sitz baths and regimen of cleanliness The wound healed by granulation in a period of three months

Further questioning of the patient elicited the fact that she habitually chewed grass It is recognized, however, that this manner of acquiring the infection is not universally accepted

Thirty two months after operation, the patient had no complaints referable to her rectum The wound is solidly healed

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CHAPTER 16

Hemorrhoids

DEFINITION

Hemorrhoids are varicose dilatations involving one or more radicles of the hemorrhoidal veins Pathologically, the process is prima facie one of degeneration in which thrombosis, rupture inflammation ulceration and necrosis may occur Clinically it is characterized by bleeding and protrusion Hemorrhoids are either globular or oblong in shape and occur in the lower portion of the rectum in the anal canal or at the anal margin Varying in number from one to eight they may represent any variety They may be small as shot or large as a lemon but usually vary from the size of a pea to that of a walnut The color may be red purple or black depending on the type duration and changes that have taken place

It is not in the province of this discussion to present historical data pertinent to hemorrhoids so ably done by Dr C J Holley in a recent publication to which the reader is referred [9]

DESCRIPTIVE ANATOMY

Venous Drainage

The hemorrhoidal plexus consists of two parts (Fig 315) (1) an internal or superior hemorrhoidal plexus situated in the submucosa and (2) an external or inferior, hemorrhoidal plexus situated outside the muscular layer The superior hemorrhoidal plexus begins as a group of venous sacs above the anorectal line These communicate with each other and form a network which for the most part drains the mucosa of the rectum From this larger veins are formed which assume considerable size and continue upward in the submucosa until they reach the middle of the rectum, where they perforate the muscular coat These veins the superior hemorrhoidal unite on the external surface of the rectum and pass upward and backward to continue as the inferior mesenteric vein which finally empties into the portal vein The inferior hem

orrhoidal plexus originates as a group of small venules, for the most part below the anorectal line and surrounding the anal canal These anastomose with the subcutaneous veins and those located on the outer *surface of the external sphincter muscle* Also joining this group are veins from the the plexus and emptying into the hypogastric vein Of smaller size is another, the middle sacral vein, which, having received branches from the lateral sacral, is connected with the upper portion of the in*ferior hemorrhoidal plexus, whence it passes* to empty into the left common iliac vein

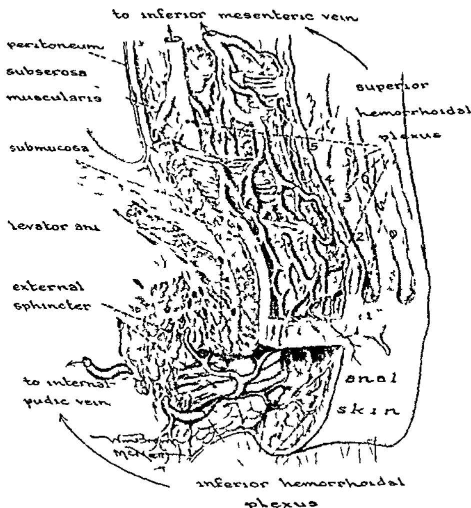


FIG 315 The venous drainage of the rectum and anal canal showing the derivation and structures (Dissection by the author)

outer surface of the rectum and levator ani From the inferior hemorrhoidal plexus thus formed are derived two large veins (a) the inferior hemorrhoidal vein composed of veins from the lower portion of the plexus and emptying into the internal pudic vein and (b) the middle hemorrhoidal vein made up of veins from the midportion of

Although the anorectal line distinguishes somewhat sharply the superior hemorrhoidal veins above (portal circulation) from the inferior hemorrhoidal veins below (caval or systemic circulation), there does exist an anastomosis between the two (Fig 315) The degree of anastomosis in this region as well as the question of the

presence of valves in the hemorrhoidal veins had lead to some disagreement

Dissections recently performed by Reuther[80] showed that in the newborn there were valves in the smaller portal tributaries of the gastric and colic regions Atrophic valves were noted at the mouths of the superior hemorrhoidal veins, while the middle and inferior hemorrhoidal veins were protected by competent valves The degree of anastomosis between the caval and portal systems was slight In the adult the valves were less numerous in the portal system and only the central ends of the middle and inferior hemorrhoidal veins were protected by competent valves The degree of anastomosis between portal and caval systems appeared to increase with age and was most marked when well developed hemorrhoids were present The chief site of anastomosis was between the superior and middle hemorrhoidal veins

As far as hemorrhoids are concerned the superior hemorrhoidal veins are represented in the internal variety while the inferior hemorrhoidal veins are represented in the external variety In other words the middle hemorrhoidal and middle sacral veins do not enter into the formation of hemororhoids

INCIDENCE

Sex Hemorrhoids are found more frequently in men (ratio 2 to 1) but this does not necessarily mean that they occur more frequently in the male sex A sense of modesty may restrain many women from submitting to examination, and, further, they are apt to attribute but minor significance to bleeding in this region because of their familiarity with the ordinary menstrual flow

Age Hemorrhoids are more common between the twentieth and fiftieth years or during the active period of life The condition in infancy would constitute a medical anomaly In old age it is occasionally encountered as a result of relaxation of the musculature

The incidence of hemorrhoids in 3 700 cases tabulated by F C Smith[10] from the private records of C F Martin as shown in the table below

ETIOLOGY

Predisposing Causes

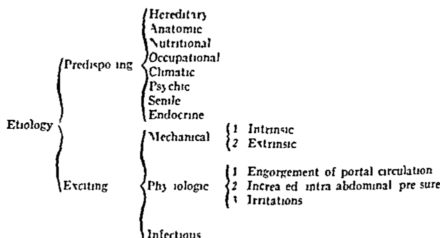
Heredity By this is meant the structural weakness of vascular tissues It has been shown by Montague[84] and mentioned by Morley[85] that such a condition is inherited and from general atony of the body tissues or increased blood pressure there results a giving way of the hereditarily weak venous structures '

Anatomic Under this heading may be mentioned (1) the erect posture of man (2) the absence of valves in the superior hemorrhoidal veins (3) the loose arrangement of the areolar tissue between the mucous membrane and the muscular coat through which various radicles ramify and are enabled to stretch in length and dilate in character [3] (4) variations from given

Age	Total Cases		Internal Hemorrhoids		External Hemorrhoids	
	Males	Females	Males	Females	Males	Females
0- 9	16	10				
10 19	33	9	4	0	6	1
0 29	3 6	189	160	73	85	42
30 39	801	337	434	187	184	9
40-49	650	307	408	185	17	109
50 59	411	183	274	117	117	56
60 69	19	74	112	41	38	27
0-79	54	26	27	10	6	3
80 89	1	3				
Unknown	22	11	10	9	9	4

anatomic structures and relations and (5) the presence of preformed tubular structures opening into the mouths of the crypts of Morgagni Noted simultaneously by Tucker[119, 120] and Pope,[9, 97] and confirmed by the writer,[6] is the fact that these minute sinuses serve as catch basins for bacteria

Nutritional Deficiencies It has been pointed out by Whitney[1, 2] that nutritional deficiencies may produce both atony of the



smooth muscle and atrophy of the connective tissue sheath of the vein and thus predispose to the formation of hemorrhoids

Occupational Severe muscular strain, such as lifting, and sedentary habits, such as the continued sitting[25] or standing posture characteristic for instance of clerks conductors and policemen predispose to this condition

Climatic Extreme heat with resulting lack of exercise may cause relaxation of tissues, and, conversely, severe cold together with muscular strain and activity may predispose to hemorrhoidal disease

Psychic Emotional strain may lead to decline in physiologic tonus which affects all body tissues especially the vascular system

Senility As degenerative changes take place, affecting all tissues of the body there is inadequate muscular support and the sphincters become thin and atonic

Endocrine Influence It is known that there may be marked dilatation of the veins of the legs and anus during pregnancy This is thought to be due to the secretion of the hormone relaxin[1] It apparently reduces relaxation of the connective tissue structures of the veins, allowing increased varicosities

Exciting Causes

In describing the etiologic factors under this heading it may be said that any cause which brings about a retarded return circulation in the veins of this area is conducive to hemorrhoidal disease, although it should be mentioned that in the light of our present day knowledge, infection is the most important cause

Mechanical Causes

Intrinsic Constipation, or its effect on the rectum, is a frequent cause of hemorrhoids, since the accumulation of hard fecal masses causes distention and pressure This not only obstructs but squeezes the blood in a direction opposite to that of the venous current Other intrinsic factors which act mechanically are tumors, stricture foreign bodies, pederasty, wounds contusions and spasm of the sphincter and levator ani muscles

Extrinsic Among the extrinsic causes may be mentioned pregnancy, retroversion procidentia and tumors of the uterus, large cysts and tumors of the ovary and hypertrophy and tumors of the prostate

Physiologic (1) Engorgement of the portal circulation, as mentioned early in the 18th century[111] is still regarded as an im

portant factor Cardiac decompensation pulmonary affections with stasis, hepatic congestion and cirrhosis of the liver, malignancy of the upper abdomen or pelvis gourmandizing and superfluous carbohydrate intake are to be included under this heading (2) Increased intra abdominal pressure from tumors straining from coughing sneezing and vomiting constrictions about the waist and violent exercise are physiologic causes (3) Mucosal irritants as certain drugs and foods may favor this condition Of the former apiol ergot jalap santonin and myrrh are the chief offenders Cathartics especially the resinous variety produce congestion of the pelvic veins increase peristalsis and distend the hemorrhoidal veins Foods that give rise to local irritation are aromatic spices mustard pepper pickles highly seasoned sauces and condiments

Infectious Causes

Of all the above mentioned causes this is probably the most important but it is to be remembered that the vitality of the part is at first lessened as shown by congestion and varicosity and that the infective process is superimposed In other words infection occurs as a result of some form of trauma and according to Runyeon[100] gains entrance through the crypts of Morgagni The inflammatory process is excellently described by Buie[77] as follows Due to trauma (from various causes) the crypts become infected and ultimately the adjacent tissues become involved The venous walls suffer the same invasion and typical phlebitis develops This weakens the venous walls until dilatation and incapacity result Ultimately a condition of varicosity develops with associated replacement fibrosis in the elastic layers and within the stroma about the veins With this appear clots leukocytic and lymphocytic infiltration and the picture is complete It is highly plausible that the crypts of Morgagni which are subject to continued irritation because of their anatomic arrangement are invaded by micro organisms which normally are present in the rectum By extension into the preformed tubular structures opening into the mouths of these crypts (see p 42), which represent lines of least resistance, the inflammatory process resulting from the bacteria and their toxins is productive of thrombosis in the already congested veins To what extent infection is the cause is controversial Although inconstant various micro organisms have been demonstrated These, in order of frequency are the *B coli* staphylococcus streptococcus and diphtheroid bacillus Threadworms (*Oxyuris vermicularis*) larvae and anal pediculi are occasionally associated with hemorrhoidal disease Hemorrhoids are relatively common following a localized inflammatory process

CLASSIFICATION

Hemorrhoids are classified according to location Those having their origin below the anorectal line are termed external hemorrhoids while those having their origin above the anorectal line are termed internal hemorrhoids Mixed hemorrhoids represent a combination of the internal and external varieties

A External hemorrhoids
B Internal hemorrhoids
C Mixed or externo internal hemorrhoids (Fig 316)

For the purpose of description hemorrhoids may be further classified in relation to their pathologic and clinical characteristics (See p 456)

External Hemorrhoids

Definition External hemorrhoids are oval swellings representing a varicosity or dilatation of the inferior hemorrhoidal veins situated below the anorectal line and covered by anal skin The varieties observed are (1) varicose (2) thrombotic and (3) cutaneous or skin tags

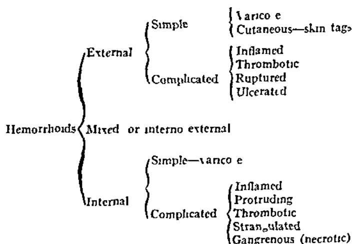
Pathology External hemorrhoids appear as globular or oblong swellings below the anorectal line and are covered by the strati

fied squamous epithelium of the anal skin For want of a better term, small, spongy, redundant or soft, cushionlike folds in the



FIG 316 Mixed or interno external hemorrhoid Above (a), the ano rectal line, is shown an internal hemorrhoid, and below, the external in the same line On the right is a cross section of the mixed hemorrhoid

anus are termed varicose hemorrhoids These represent only a mild degree of tortuosity and dilatation of the venules, to



gether with a slight increase in the connective tissue This type may be absorbed within from 10 to 20 days, or may remain over a period of years, sometimes becoming complicated External hemorrhoids may become thrombotic with or without subsequent rupture Not infrequently inflammation and ulceration are superimposed Cutaneous hemorrhoids, commonly called "skin tags," are shriveled, hypertrophied folds of anal skin in which fibrosis has occurred as a result of organization The blood vessels become more or less atrophied and the modified anal skin and subcu

taneous tissue become hypertrophied so that fibrous tissue is deposited In reality, these skin tags are not true hemorrhoids but represent redundancies of the skin about the anal margin On section it is noted that the hemorrhoidal mass is made up of a group of small venous radicles with a few arterioles and areolar tissue Abnormal tortuosity and dilatation of the veins are noted and they appear held together or somewhat separated by fibrous tissue Extravascular and intravascular clotting is a more or less constant feature

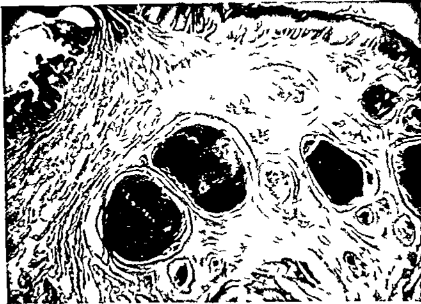


Fig 317 Low power section through an excised hemorrhoid showing the distended vessels some of which are entirely occluded by thrombosis

Histopathology Hemorrhoidal tissue represents essentially a degenerative process Venous dilatation with atrophy of the walls especially the adventitia and media is characteristic In each specimen the elastic tissue is replaced to a varying degree by fibrous tissue Round cell infiltration is noted and thrombi single or multiple large and small superficial and deep are seen throughout (Fig 317) A few mononuclear leukocytes and plasma cells are present also All hemorrhoids of the external variety are covered by stratified squamous epithelium In the thrombotic type the subendothelial layer contains many extremely widened vessels engorged with erythrocytes In the vast majority of instances, clots are observed outside as well as inside the vessel, so that quite frequently the intima media and adventitia are ruptured Skin tags or cutaneous hemorrhoids are composed of fibrous connective tissue The dermis epidermis and subcutaneous tissue chiefly the last, are hypertrophied Changes in the blood vessels also are seen The formation of a hemorrhoid may be described as follows From causes enumerated under etiology pressure is brought to bear which impedes or slows up the circulation Venous dilatation occurs interfering with the nutrition of the part, and this malnutrition is followed by degeneration of the vascular lining with resulting thrombosis This represents intravascular clotting since it occurs within the lumen of the veins Extravascular clotting such as is usually seen in the external thrombotic type of hemorrhoid is due to rupture of a varicose vein with extravasation of blood into the cellular tissue surrounding it

External Varicose Variety Defini

TION This is a varicose condition of the subcutaneous veins and appears as one or more puffy folds in the anus (Fig 318) These vary in size and if edema is present, may become quite large Ordinarily there is but a slight degree of thrombosis and the connective tissue stroma is loosely arranged To a great extent these varicose hemorrhoids represent a dependable index as to the presence of internal hemorrhoids above They usually occur as the result of some previous anorectal affection particularly untreated hemorrhoids in which the clot has been absorbed, or of long standing constipation

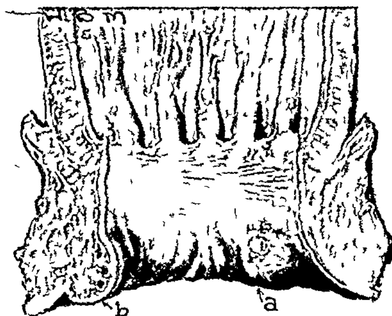


Fig 318 Coronal section of lower rectum and anal canal showing (a) external varicose hemorrhoid and (b) same on cross section

Symptoms The onset is insidious and except for a sense of fullness or uneasiness about the anus especially during defecation the symptoms are negligible Complications, of course alter the symptomatology

Diagnosis The diagnosis is made on the presence of one or more puffy, cushionlike folds, usually on the anterolateral or posterolateral aspects of the anal canal They are covered by anal skin, beneath which may be noted tortuous and dilated veins

Treatment When of small size, this variety requires no treatment Palliative measures, such as the use of liquid petrolatum given in sufficient quantities to insure semiliquid stools, and the avoidance of drastic purgatives are recommended Astringent ointments and lotions of lead acetate nutgall, tannic acid, zinc oxide and copper sulfate may be employed (These formulae will be found on p 475) Surgery is seldom indicated in these cases unless the protrusions are large or complicated If only one is present, the area is anesthetized as described under Anesthesia page 963, and the veins excised with scissors dissected out or destroyed by means of the Paquelin cautery A better procedure is to make a V shaped incision around the base of the pile apply the clamp and excise the proximal tissue with scissors Then the remaining stump is seared with the actual cautery or sutured (over and under the clamp) with catgut (See Operative Method) The after treatment consists of applications of hot boric acid compresses mercurochrome 5 per cent, or gentian violet 1 per cent, topically

External Thrombotic Variety Definition An external thrombotic hemorrhoid is an oval swelling, varying in size from a split pea to a small walnut, occurring beneath the anal skin and below the ulceration exists Spasm of the sphincter and levator ani muscle is usually present Itching though not intense, may be cited, while a sense of fullness in the lower rectum is not uncommon

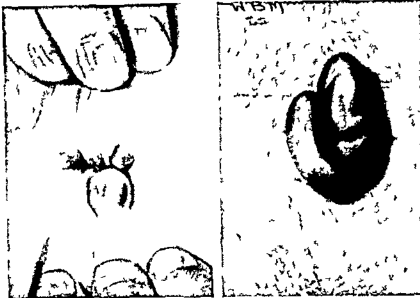


Fig 319 (*Left*) External thrombotic hemorrhoid One of smaller size may be seen above on the opposite side (*Right*) External thrombotic hemorrhoids of large size

anorectal line (Fig 319) It may be single or multiple and livid or blue, according to whether it is superficial or deep Usually it is firm, quite tender and slightly movable

Etiology This is the most frequent type of the external varieties and is usually induced by straining at stool violent exercise or some inflammatory condition of the inferior hemorrhoidal veins

Symptoms A swelling in the region of the anus developing suddenly and causing pain of a severe character, is usually complained of by the patient The pain is continuous and aggravated by defecation sitting posture or any form of movement, as well as by increase in intra abdominal pressure It becomes throbbing in type, but this is *lessened* as the clot is absorbed sufficiently to relieve the pressure on sensory nerve endings which occurs usually in from three to five days The swelling is tender and is especially marked if inflammation or

Diagnosis A history of sudden onset, pain of a stinging or throbbing character brought on by violent exercise or straining at stool and the presence of an oval swelling smooth bluish in color, slightly movable firm and tender to the touch, covered by anal skin and occurring below the anorectal line indicate the correct diagnosis

Differential Diagnosis Thrombotic hemorrhoids are occasionally mistaken for various other conditions which have their origin below the anorectal line and for some which arise above and protrude through the anal aperture

Processes At or Below the Anorectal Line Anal papillae may be forced down by stool and appear at the anal orifice They arise from the anorectal line are covered by anal skin and are tender to the touch The apex is usually pointed and frequently white in color while the base is broad and pink A sentinel pile is covered by anal skin

and is located at the anal margin, usually in the midline posteriorly It is fibrous in nature and is always associated with fissure immediately above Anal epithelioma is nodular in contour, its base broad and in broad base They are pale in color, usually painless and may be single or multiple In pruritus ani, the radiating or cutaneous folds of the skin are edematous, hypertrophied and elongated, which gives the

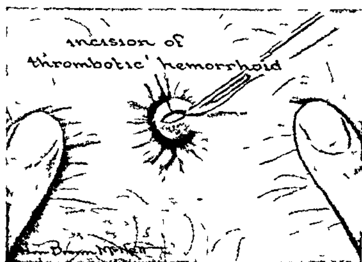


Fig 320 Method of incising the skin overlying an external thrombotic hemorrhoid Note the incision is longitudinal

durated Excessive granulations are noted The ulcer is craterlike with fungating granulations along the edges, it is friable and bleeds easily A biopsy should be taken to verify the diagnosis In anal tuberculosis, the appearance is moth eaten and the ulceration is soft, shallow and round or oval in shape The edges are sharply defined and elevated, while the base is gray in color, elevated and spotted with yellow tubercles Condyloma latum (papular syphilid) occurs as moist, flat elevations the edges of which are sharply defined and at right angles to the skin Occurring either singly or in groups, they have a flat surface covered with a grayish, necrotic membrane The blood Wassermann is positive Condyloma acuminatum occurs as a warty growth consisting of closely aggregated collections of tufted or pedunculated projections They are of a pinkish or purple color usually covered by decomposed secretions possessing an offensive odor Skin tags are found at the margin of the anus as a redundancy of the anal skin or as teatlike folds with a area a leathery appearance The sulci between these folds are fissured or cracked, and intense itching is present

Processes Having Their Origin Above the Anorectal Line Protruding internal hemorrhoids are present as soft, red sacculations They are covered by mucous membrane and have a tendency to bleed Ordinarily this variety may be replaced, unless strangulated Prolapse of the mucous membrane of the rectum is of gradual onset and is covered by mucous membrane Ordinarily it is reducible has a tendency to bleed freely and is characterized by its longitudinal furrows radiating from the anus Polyps protruding through the anal aperture usually occur singly They are round or oval in shape, covered by mucous membrane smooth, firm to the touch glistening red in color pedunculated and bleed easily Villous tumor is of slow growth it is spongy to the touch dark red in color and has projecting villi that bleed freely

Treatment *Palliative* This procedure is not curative but offers the hope of lessen

ing the discomfort and temporarily decreasing the contractions of the sphincter muscle during the initial stage It consists of rest in bed, application of gauze wrung out of hot boric acid solution, liquid petro

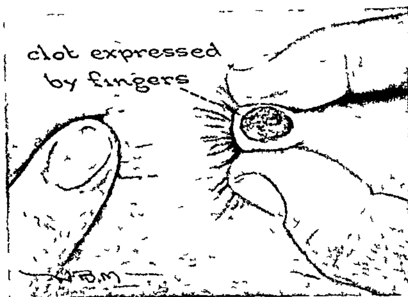


FIG 321 After making the incision the clot is squeezed between the fingers Occasionally it is necessary to separate the small fibrous attachments with curved scissors

latum, from ½ to 1 ounce night and morning to insure semisolid movements, instillations of hot olive oil, from 1 to 2 ounces, and hot sitz baths Various ointments have been prescribed of which the following may be employed

℞

Acetanalid	ʒ i
Petrolatum	q s ℥ i
Sig Apply locally	

℞

Ung stramonii	ʒ i ss
Ung belladonnae	ʒ ii s
Ung acidi tannaci	ʒ ss
Sig Use in and outside of anus	

℞

Ichthyol	gr xxv
Anesthesine	ʒ ss
Argyrol	ʒ i
Petroleum jelly	q s ad ℥ i
Sig Apply locally	

Suppositories are of little or no value except for their psychologic effect on the patient Ingredients such as morphine or cocaine are unnecessary, for without exception the author has never seen a case in which the continuous application of hot boric acid compresses has failed to relieve markedly the distressing symptoms

Surgical Thrombotic hemorrhoids may be removed through an incision in the skin of the pile mass or by excising a small portion of the skin and dissecting the clot free The patient is placed in the left lateral (Sims) or the lithotomy position The anal and perianal skin is swabbed with a solution of picric acid, acetone and alcohol, after which the area is wiped with dry gauze

Incision Analgesia A few minims of a 1 per cent procaine solution are injected into the surface of the hemorrhoid by means of a fine, sharp pointed needle By injecting the solution in the line of the proposed incision and in the layers between the skin and the clot the pile mass will be made to appear swollen

Technic A single incision is made in the longitudinal axis from within out (Fig 320) and the clot expressed by finger pressure on each side (Fig 321) If the clot is

adherent, the fibrous attachments are then severed with a curved bistoury or scissors

After treatment consists of confining the bowels for a period of 24 hours and ad

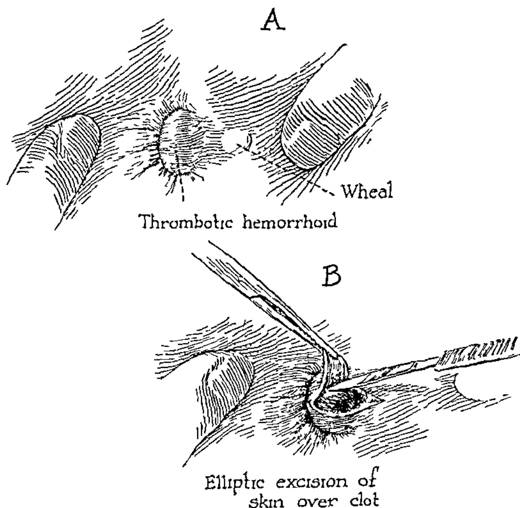


Fig 322 (A) A small wheal has been raised just outside the thrombotic hemorrhoid Through this the procaine solution is injected beneath the pile (B) Method of removing external thrombotic hemorrhoid Elliptic excision of skin overlying the pile preparatory to removal of the clot

ministering mineral oil, from ½ to 1 ounce, twice daily by mouth Hot sitz baths two or three times daily on the second day, will afford relief from the local soreness Mercurochrome, 5 per cent or gentian violet 1 per cent, is applied until the wound has healed completely

B *Excision* The position of the patient and preparation are as before

Analgesia An intradermal wheal is raised just distal to or outside the thrombotic hemorrhoid (Fig 322) with a few minims of a 1 per cent procaine solution, using a 25 gauge sharp pointed needle attached to a 2 cc glass hypodermic syringe After the needle has been introduced through the wheal it is slowly advanced beneath the pile mass and a small amount of the solution deposited until a total of from 1 to 2 cc is injected In this manner the hemorrhoid is analgized by the infiltration Approximately three minutes should elapse before the excision Quite frequently the proximal end or the part opposite the insertion of the needle will be found sensitive, but this can be controlled by inserting the needle to the full length of the hemorrhoid and depositing a few minims of the solution at this site

Technic The skin overlying the pile mass

is held with a hemostat and an elliptic piece of skin conforming to the size of the clot is excised as shown in Figure 322 Usually the clot can be scooped out without difficulty, but in case it is firmly adherent, the skin edges are gently retracted, the fibrous attachments snipped with curved scissors and the clot in its entirety is lifted easily from its bed Finally the base is curetted and if necessary, the overhanging skin edges are trimmed to insure good healing Bleeding is negligible and may be controlled readily by pressure or by hemostats temporarily applied Ordinarily the wound is permitted to remain open

Postoperative Treatment Usually the movements are confined for 24 hours Liquid petrolatum, from ½ to 1 ounce, is given twice daily by mouth and hot sitz baths are begun for local soreness If this is marked during the first 24 hours, compresses wrung out in hot boric acid solution and applied locally are beneficial The wound is touched daily with a mild antiseptic solution, after which a powder, as zinc stearate or thymol iodide and bismuth subcarbonate, is dusted on The diet should be soft until after the first evacuation when the regular menu is resumed

Cutaneous Variety SYNONYMS Cutaneous hemorrhoids are usually designated as connective tissue sentinel, edematous or fleshy piles although the term skin tags or tabs is more descriptive and is therefore commonly employed

DEFINITION A cutaneous hemorrhoid or skin tag is a hypertrophy of one or more folds of the anal skin located at the margin of the anus and is composed of connective tissue and a few blood vessels Frequently appearing somewhat shriveled it occurs as a flabby redundancy or as a teatlike projection with a broad base Cutaneous hemorrhoids or skin tags are usually pale in color and may be single or multiple They are covered by skin and are composed essentially of connective tissue (Figs 323, 324) A so called ' sentinel pile' of Brodie [6] is also fibrous in nature, crescentic or pyramidal in shape flesh colored, located usually in the posterior midline and always associated with a fissure

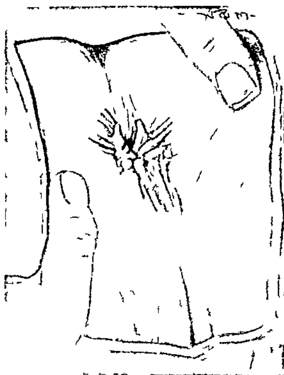


FIG 323 Skin tags showing the various shapes and sizes

ETIOLOGY A previous thrombosis of a branch of the inferior hemorrhoidal veins is probably the most frequent cause Inflammatory processes of the rectum such as ulcerative proctitis stricture fistula, internal hemorrhoids and cryptitis and of the anus, as fissure, condyloma and pruritus are additional factors in the etiology Unfortunately skin tags only too frequently follow hemorrhoidal operations due to interference with the lymphatic drainage and faulty selection in the removal of anal skin It has been our experience that these tags are more prone to occur after the ligature operation than where the clamp cautery is employed Too rapid dilatation of the sphincter muscle has also been mentioned as a cause [95]

SYMPTOMS Although the patient is cognizant of their presence, skin tags offer no symptoms unless they are inflamed In other words this variety of hemorrhoid



FIG 324 Skin tags

ordinarily causes neither bleeding nor pain Difficulty is often encountered in keeping the parts clean, so that by the accumulation of fecal material and of secretions incident to the hemorrhoids, a pruritus may be incited Should these tags become irritated, they often become inflamed, causing extreme tenderness and subsequent irritability of the sphincter muscles

DIAGNOSIS A history of a previous thrombotic hemorrhoid, termed by the patient "outside pile,' or some anorectal affection is usually cited The presence of one or more flabby projections that are flesh colored, shriveled, covered by anal skin and occurring about the anal margin will distinguish the diagnosis

DIFFERENTIAL DIAGNOSIS Skin tags are to be differentiated from external thrombotic hemorrhoids, condylomata acuminata, condylomata lata, anal papillae anal and perianal tuberculosis epithelioma, pruritus ani, polypoid growths of the rectum, protruding internal hemorrhoids and mucous prolapse of the rectum, for which the reader is referred to the differentiating features on page 544

TREATMENT *The palliative treatment* consists of cleanliness, proper regulation of the bowels the local application of hot, moist compresses, if inflammation is present, and a soothing ointment, as

℞
Ichthyol ʒ iv
Ung belladonnae
Ung stramonii āā ʒ i
Sig Apply locally

Morgan[81] suggests the following

℞
Strong solution of lead subacetate 60 minims
Cow s milk to 1 oz

Surgical Treatment Operation is indicated where the inflamed tag has not responded to palliative measures, especially if it is complicated by or associated with external hemorrhoids, fissure pruritus or any condition that aggravates it Any such process should of course, be corrected

Analgesia If but one skin tag is present, from ½ to 1 cc of 1 per cent procaine solu

tion is injected into its base In the presence of acute inflammation it is advisable to make a wheal just outside of or distal to *the tag for the initial injection* of the procaine Should two or more of these cutaneous folds be present about the circumference of the anus the perineural method, as described under anesthesia and analgesia, page 963, is advocated

Technic Following anesthetization the tag is grasped with hemostats and excised by means of an incision around its base (Fig 325) To insure proper healing and coaptation of the skin edges the incision should be made so that its apex will point toward the anal aperture Care should be taken not to remove too much anal skin Bleeding points are controlled by pressure temporarily applied or ligature Ordinarily the wound is permitted to remain open although it may be sutured (Fig 326) The after treatment consists of the daily application of some antiseptic solution as gentian violet 1 per cent for two or three days Compresses wrung out in hot boric acid solution may be advantageously applied for the edema and soreness during the first 24 hours Hot sitz baths three or four times daily are employed when necessary Later sterile gauze impregnated with boric acid ointment or sulfathiazole and held in place by a T binder may be used until the wound is entirely healed

Internal Hemorrhoids

Definition Internal hemorrhoids are swellings or tumors representing a varicosity of one or more radicles of the superior hemorrhoidal veins They have their origin above the anorectal line and are covered by mucous membrane (Fig 327)

Pathology Internal hemorrhoids are usually globular in shape somewhat regular in outline and reddish in color, with a smooth, glistening surface The base is frequently broad but may be pedunculated Because of the anatomic distribution of the superior hemorrhoidal veins, which are

Fig 325 (a and b) The skin tag is held taut and an elliptic incision is made around its base Fig 326 (*Bottom*) To control bleeding following removal, *two or three interrupted sutures of fine* catgut or silk may be inserted as shown

fairly constant, internal hemorrhoids are usually located in the right and left posterior and right interior quadrants of the rectum This is explained on the basis that the left branch of the superior hemorrhoidal artery passes down the rectal wall undivided while the right branch divides into anterior and posterior branches[88] Hemorrhoids frequently become complicated by such factors as infection, ulceration and necrosis These are pathologic entities, whereas protrusion and strangulation are clinical manifestations If acutely inflamed, they appear swollen and congested At times, superficial denudation of the epithelium is present which gives them a raw appearance Due to trauma and infection, superimposed ulceration may occur Subsequent healing takes place by granulation with resultant fibrosis or if the thrombosis is so marked as to devitalize the hemorrhoidal mass and completely obstruct the circulation (venous and arterial) necrosis or gangrene ensues

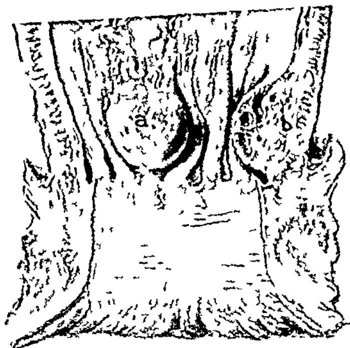


Fig 327 (a) Internal hemorrhoid (b) Same on cross section

Thrombotic hemorrhoids are usually present as hard, globular or elliptic tumors that are dark red in color, firm to the touch and movable Protruding piles, a clinical manifestation, often are oblong in shape, bright red in color and smooth and glistening in appearance This variety not infrequently becomes strangulated

In order to understand and interpret more clearly the pathologic as well as the clinical process of strangulation, a brief description of thrombosis is essential Veins are the site of election for thrombosis, which in itself, is a constant feature of hemorrhoidal disease It is known that trauma and inflammation are conducive to alteration in the balance between the constituents of the blood In other words, they represent the main causes of thrombosis As a result of trauma or inflammation, the blood platelets become conglutinated, adherent to the walls and thromboplastin is liberated[88, 90] For the most part, the agglutination of the platelets is brought about by the fibrinogen of the plasma[10] By the action of thrombin, an enzyme, fibrin is produced which in turn entangles many leukocytes and erythrocytes and a clot i

formed Where inflammation occurs, the walls of the vein are infiltrated with the inflammatory exudate, and, as the endothelium becomes involved, thrombosis rapidly ensues Karsner[14] remarks 'It rapidly involves all the structures of the wall whether it originates within or outside the vein and in the majority of instances it is impossible to distinguish an end or periphlebitis ' By studying tissue sections of strangulated hemorrhoids thrombosis is shown to be much in evidence and it is our feeling and contention that this thrombosis is the direct *cause of strangulation The sequence may* be described as follows Internal hemorrhoids like other types show varying degrees of thrombosis From various causes these pile masses may protrude through the anal aperture As a result of pressure of the sphincter muscle incident to its contraction this latter being itself intensified by the irritation attendant upon such acts as walking sitting and defecation, the protruding pile masses become congested later edematous and therefore increased in size If the degree of edema is not too great the hemorrhoids can be replaced although in some instances this is possible only after the degree of swelling has been lessened by the application of heat On the other hand, strangulated hemorrhoids cannot be pushed into the rectum, not because of the contraction of the sphincter, but because of an acute thrombosis of the inferior hemorrhoidal veins It seems expedient to mention that the author has been able to verify in part the clinical observations by histopathologic findings Hibshman summarized strangulation as follows If through trauma this protruding hemorrhoidal mass becomes thrombosed, there usually is an acute thrombosis of the inferior hemor*rhoidal vein in the same line Then* we have what is known as a strangulated hemorrhoid (Fig 328) Previously, the thrombosis could be replaced but owing to the thrombosis of the inferior vein the hemorrhoidal mass is held outside of the aperture ' This is somewhat distinct from the usual explanation that strangulation is due to or the result of sphincteric contraction Although this subject is controversial and therefore not universally accepted it may be mentioned that during the past few years the author has painstakingly examined many cases of strangulated hemorrhoids and invariably found it possible to insert the well lubricated finger through the



Fig 328 A case of strangulated hemorrhoids

anus and into the rectum without undue discomfort to the patient Smith[108] confirms these findings and states, "There is never the slightest difficulty in inserting one, two, or at times three fingers through the external sphincter alongside the protruding hemorrhoidal mass, which procedure would be impossible were spasm present In fact, the sphincter in this condition is in a state of partial paralysis" If strangulation is per

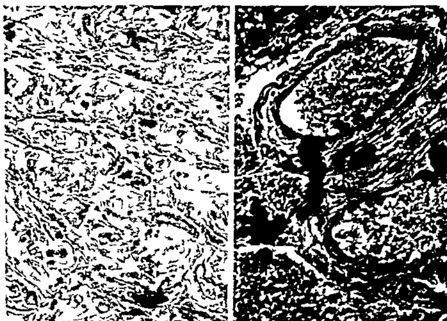


Fig 329 (*Left*) Strangulated hemorrhoid Section showing marked increase in fibrous connective tissue and complete sclerosis of some of the vessels (*Right*) Strangulated hemorrhoid High power section through hemorrhoidal area The lower vessel shows thrombosis



Fig 330 Internal hemorrhoid Section shows infiltration of mucosa with plasma cells and lymphocytes denoting chronic inflammation The submucosa is increased so far as the number of vessels is concerned—and these are distended with blood The surrounding stroma shows the changes of chronic inflammation

mitted to remain over a period of time, gangrene of the part ensues

Histopathology All internal hemorrhoids are covered by mucous membrane being lined by columnar epithelium The simple type of internal hemorrhoid represents a group of dilated and tortuous venules with a few arterioles and areolar tissue Venous dilatation is a constant feature The walls of the veins especially the media and adventitia, are atrophied and the smooth muscle fibers replaced by connective tissue in varying amounts Not infrequently these appear as thin endothelial lined tubules of fibrous tissue Round cell infiltration usually is apparent as well as mononuclear leukocytes and plasma cells Thrombi, both large and small superficial and deep are seen throughout No change is to be noted in the arterioles (Figs 329 330)

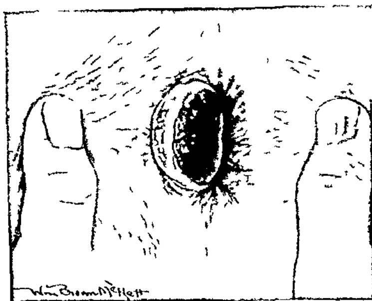


Fig 331 Protruding internal hemorrhoid associated with edema of the anal skin

Symptoms In general the symptoms of internal hemorrhoids are bleeding and protrusion although pain is characteristic where complications arise Itching leakage constipation and reflex disturbances frequently are complained of by the patient

Bleeding Although occasionally absent, bleeding is the earliest symptom and generally occurs during or following defecation It is usually irregular or intermittent in type and varies from a streaking of the stool or toilet paper, in mild cases, to profuse hemorrhage in others The blood is usually bright red in color due to recent trauma but may also be dark with or without clots if permitted to remain in the rectum any length of time Prolonged bleeding often results in secondary anemia of varying degrees with its associated pallor vertigo and weakness

Protrusion Although the most common feature this is usually a later manifestation of internal hemorrhoids It is frequently due to hemorrhoids that have existed over a long period of time where there is decreased tone of the sphincter muscle or structural weakness At first, the protrusion is slight and appears at the anal aperture during defecation or after purgation as an ovoid mass which recedes spontaneously and quickly Later due to continued pressure or direct trauma the hemorrhoids protrude to a greater degree and often cease to return, so that the patient finds it necessary to reduce them manually

Periodic protrusion tends toward relaxation of the sphincters, so that protrusion occurs on the slightest provocation, such as walking, lifting, sneezing or coughing Due to the relaxation of the supporting tissues, an eversion of the anal skin frequently occurs immediately below the protruding internal hemorrhoid (Fig 331) Hemorrhoids that continue to protrude are subject to additional traumatism from the clothing and the ever present mucous discharge, so that the parts become inflamed, swollen and at times ulcerated

PAIN In the simple variety of internal hemorrhoids there is no pain but rather a sense of fullness or weight in the rectum Often the patient complains of a false desire to defecate or a feeling of incomplete evacuation, either of which may be due to pressure of the hemorrhoids lying on the floor of the rectum At times defecation is most difficult and straining ensues with resultant venous engorgement, causing the hemorrhoids to become larger Where thrombosis has occurred, the pain is dull, achy and continuous It is usually most severe if the hemorrhoids protrude and are grasped by the sphincter In strangulation, the pain assumes an excruciating and throbbing character, and the patient is markedly distressed being unable to walk, sit or lie down Such intense discomfort is the result of spasmodic contraction of the sphincters and levator ani muscles Where ulceration is present the pain is more apt to be agonizing

ITCHING This is not an uncommon complaint in hemorrhoidal disease especially where protrusion is consistently present The cause for this may be reflex, but in a large proportion of cases it is due to the discharge of mucus from the exposed surface of the hemorrhoid

LEAKAGE Mucus is of frequent occurrence and is most marked in the presence of protrusion Irritation of and from the hemorrhoidal mass causes a stimulation of the goblet cells of the mucosa which in the presence of relaxed sphincters, seeps through the anal aperture This may be referred to as a moisture or discharge It is annoying in itself, yet the pruritus which often develops subsequently is more tormenting and distressing to the patient

REFLEX DISTURBANCES Internal hemorrhoids frequently give rise to reflex symptoms, some of which may be quite remote from their point of origin Constipation resulting from fear of bowel movement together with irritation of the anorectal area by the hemorrhoidal mass is common "The presence of piles," according to Beeler,[13] "which destroy the essential reflex arm of the act of defecation is the real beginning of the majority of cases of constipation the cure of piles will bring about the re establishment of sensory activity and restore bowel movement" Flatulence, indigestion and anorexia usually follow Irritation of the bladder, as from frequent micturition dysuria or anuria may occur reflexly over the pudic nerve Symptoms referable to the ovaries, as menstrual disorders may be present also Pain of varying intensity may be referred to the back, hip, leg and foot, and diagnosed respectively as lumbago, sciatica and neuritis This may occur by way of the iliolumbar or sciatic nerve Weakness irritability and mental depression are not infrequent

DIAGNOSIS A history of passing bright red blood, protrusion at stool and fullness or weight in the rectum is suggestive of hemorrhoidal disease but a correct and absolute diagnosis can be made only by inspection and careful digital and proctoscopic examination To assist in the diagnosis, the fact should be stressed that all internal hemorrhoids have their origin above the anorectal line and therefore are covered by mucous membrane On inspection with the patient in the left lateral position and the cheeks of the buttocks well separated the finding of one or two puffy folds of skin radiating from the anal aperture suggests the presence of internal hemorrhoids above Should the sphincter be markedly atonic or ataxic the rectal mucosa frequently comes

into view Uncomplicated internal hemorrhoids cannot as a rule, be palpated within the rectum, although occasionally they may be felt as longitudinal folds extending upward from the anorectal line Thrombotic view The usual location of internal hemorrhoids is right posterior, left posterior and right anterior in the circumference of the rectum Strangulated hemorrhoids may be diagnosed by the acuteness of onset, ex

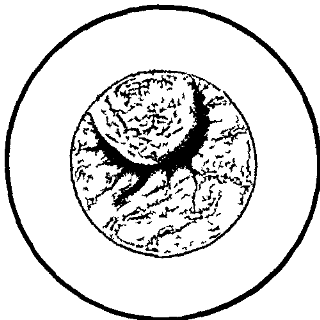


FIG 332 Low proctoscopic view showing internal hemorrhoid

piles are firm to the touch whereas hemorrhoids that occasionally protrude are softer in consistency and globular in shape In cases where protrusion is more or less a constant feature the mucosa covering the hemorrhoidal mass feels somewhat thickened because of the fibrosis present On proctoscopic examination internal hemorrhoids appear as sacculated swellings covered by mucous membrane If the patient is asked to strain or bear down the hemorrhoidal tissue will protrude into the orifice of the proctoscope as shiny, red masses on the surface of which slight oozing of blood may be noted (Fig 332) To facilitate better demonstration of the hemorrhoids the speculum should be withdrawn slightly for a distance of half an inch or so after insertion of the instrument to its full length and then it should be gently pushed inward again until the pile masses are brought into cruciating pain of a throbbing character, thrombosis, the irreducible protrusion, edema and local inflammation

DIFFERENTIAL DIAGNOSIS Internal hemorrhoids are frequently confused with many affections of the rectum and anus among which the following are to be differentiated Polyps are of slow development, are distinctly globular in shape and are always pedunculated In addition they are more prone to occur in the upper rectum above the hemorrhoidal area They may be single or multiple and are incapable of sudden erection or collapse The surface is smooth the consistency elastic but firm and the color pink Carcinoma is more frequent after forty and occurs more often in the midrectum and upper rectum The outline is distinctly irregular and nodular It is firm with definite fixation which is not present in hemorrhoidal disease A large,

Table 36 Differential Diagnosis

	Internal Hemorrhoids	Hypertrophied Anal Papillae	Adenoma	Mucous Prolapse	Procidentia	Carcinoma	Villous Tumor
Age	20 to 50	Any age	Any age	Young and old most frequent between 1 and 5	Usually adults and advanced age	40 to 60	Adult life
Covered by	Mucous membrane	Modified anal skin	Mucosa	Mucosa	Mucosa	Mucosa	Mucosa
Location	Within one inch above anorectal line	Originate at anorectal line and protrude upward usually	Most usual in mid rectum or upper rectum	Any site usually lower third	Any site of rectum or sigmoid	More common in upper rectum	Midrectum
Size	Small or moderate	Usually small	Variable	Quite large	Very large and thick	Moderate or large	Enormous
Color	Red	Pinkish	Pale red	Glistening and red	Glistening and red	Bluish red and necrotic in appearance	Either bright or dark red
Shape	Ovoid or globular	Conical	Well defined lobulated or globular	Spherical	Oval	Irregular	Lobular
Consistency	Soft and smooth	Firm	Firm and finely nodular	Soft smooth	More firm smooth and velvety	Hard irregular and nodular	Soft and spongy
Number	1 to 4	1 to 8	Single or multiple	Single	Single	Single	Single
Characteristics	Bleeding usually bright red any degree from oozing to a spurting No pain unless complicated	Tender to touch if inflamed Do not bleed	New growth sessile or pedunculated bleeds readily tends to undergo malignant degeneration	Onset gradual consists of mucous membrane only presents longitudinal furrows radiating from anus	Includes all coats of rectum shows concentric folds	New growth begins as a nodule later becomes fixed and ulcerated ulcers are craterlike mucopurulent discharge odor is fetid and at times characteristic Bleeding is almost always present Metastasis occurs confirmed by biopsy barium roentgenogram	Projecting villi that bleed readily and secrete mucus Very slow development

excavatin, or craterlike ulcer soon develops, the discharge from which is mucopurulent The diagnosis is confirmed by biopsy Villous tumors are extremely rare They are composed of numerous projecting villi and usually occur singly, they are lobular in shape, soft, spongy and red in color They bleed readily, constantly secrete

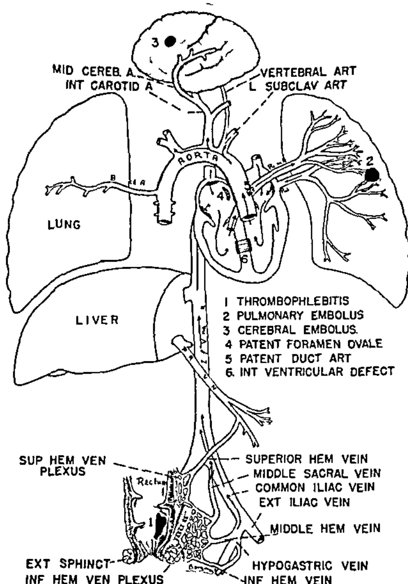


FIG 333 Chart (schematic) illustrating the various pathways of emboli from the veins of the rectum and regions distal to the inferior vena cava The arrows indicate the course taken by a rectal embolus (1) through either the middle sacral vein or middle hemorrhoidal vein into the inferior vena cava through the right heart and pulmonary artery into the lung (2) eventually absorbed here by the wide pulmonary venous capillaries and passed into the pulmonary vein thence through the left heart into the aorta and then to the brain (3) or other arterial branches The so called paradoxical embolism in the systemic circulation is made possible when there is present (4) patent foramen ovale, (5) patent ductus arteriosus or (6) interventricular defect (S Schapiro Am J Surg vol 51, No 2 February, 1941)

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Color	Red	Pinkish	Pale red	Glistening and red	Glistening and red	Bluish red and necrotic in appearance	Either bright or dark red
Shape	Ovoid or globular	Conical	Well defined lobulated or globular	Spherical	Oval	Irregular	Lobular
Consistency	*Soft and smooth*	Firm	Firm and finely nodular	Soft smooth	More firm smooth and velvety	Hard irregular and nodular	Soft and spongy
Number	1 to 4	1 to 8	Single or multiple	Single	Single	Single	Single
Characteristics	Bleeding usually bright red any degree from oozing to a spurting No pain unless complicated	Tender to touch if inflamed Do not bleed	New growth sessile or pedunculated bleeds readily tends to undergo malignant degeneration	Onset gradual consists of mucous membrane only presents longitudinal furrows radiating from anus	Includes all coats of rectum shows concentric folds	New growth begins as a nodule later becomes fixed and ulcerated ulcers are craterlike *mucopurulent* discharge odor is fetid and at times characteristic Bleeding is almost always present Metastasis occurs confirmed by biopsy barium roentgenogram	Projecting villi that bleed readily and secrete mucus Very slow development

implies, consists of alleviating the discomfort preventing prolapse and averting hemorrhage *Regulation of the bowels is an* important factor and may be accomplished by the use of liquid petrolatum, drachms ii to ounce i once or twice daily to prevent irritation and straining Enemata of warm water or olive oil are beneficial where fecal material is retained in the rectum The diet must be regulated it should consist of those foods which leave little or no fecal residue Fresh fish, well cooked vegetables and ripe fruits should form the greater part of the menu Highly seasoned foods, condiments and alcohol are interdicted Moderate exercise tends to increase the tone of the supporting tissues in uncomplicated cases Rest in bed with elevation of the hips by means of a pillow beneath the buttocks frequently offers comfort to the patient Compresses wrung out in hot boric acid solution and continuously applied are most beneficial, especially where inflammation and edema are present If strangulation exists the above procedure should be followed continuously as it tends to lessen the edema and hasten organization of the thrombus When the patient is able to be out of bed hot sitz baths 110° F three or four times daily are of utmost value Instillations of warm olive oil 2 to 3 ounces ichthyol 1 ounce of a 25 per cent aqueous solution or fluid extract hamamelis (witch hazel) 1 *ounce given night and morning* will often minimize the discomfort and retard the bleeding

Astringents in the form of ointments may at times be used to advantage as ext belladonnae gr iii to petrolatum ounce i, *zinc oxide 5 per cent or ichthyol from 5 to* 10 per cent Tuttle suggested

℞
Tannic acid	
Ichthyol	āā gr v
Ext belladonnae	gr ½
Ext hamamelis	gr x
Oleum theobromatis	q.s
M et ft	Suppositoriae No I

Where the hemorrhoids are irritated Pruitt recommends the following

℞
Phenolis	gr x
Zinc oxidi	ʒ ii
Liquor calcis	
Aquae rosae	āā ℥ iii

Sig Apply locally

and Yeomans

℞
Gall	℥ I ss
Opium pulv	ʒ ss
Petrolat	ad ℥ I

M et ft unguentum
Sig Apply locally

In the presence of severe pain with spasm of the sphincter muscle, the following may be used either in suppository or ointment form

℞
Morphinae sulphas	gr v
Ext belladonnae	gr xx
Petrolatum	℥ i

M et ft unguentum
Sig Apply through pile pipe (DeBere) or collapsible ointment tube

or

℞
Cocainae muriatis	gr v
Ext opii	ʒ i
Lanolinae	
Ung acidi tannici (10%)	āā ℥ ss

For bleeding the following prescription has proved effective according to Gant

℞
Ichthyol	
Acidum gallicum	āā gr xxiv
Bismuth subnitras	gr xxxii
Oleum theobromatis	q.s
M et ft suppositoriae	No vi

Sig Insert one thrice daily

Cook prescribes

℞
Ext suprarenal gland	
Ext opii	āā ʒ i
Ung simplicis	℥ i

Among the other remedies used may be mentioned Monsel s solution adrenalin 1 1,000 and tannic acid Topical application of a silver nitrate stick, or 10 per cent solution and sulphate of copper are indicated especially if erosions or ulcerations are present

Treatment of Protruding Hemorrhoids The patient sooner or later learns to replace

mucus and may reach enormous proportions A benign adenoma may be single or multiple it is smooth, pale red in color and firm with broad base Hypertrophied anal papillae arise at the anorectal line and may become broken up and form septic emboli which subsequently may be carried to the liver [5] Secondary anemia is not uncommon and occurs more from the loss of small amounts of blood over a long

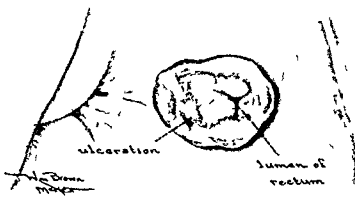


Fig 334 Internal hemorrhoids and edema of the anal margin One area had undergone malignant degeneration, as was shown by microscopic study (Author s case)

are covered by modified anal skin They are usually conical in shape, firm in consistency and pinkish white in color Mucous prolapse occurs as a single spherical mass and is characterized by its smooth appearance, with longitudinal furrows radiating from the anus, whereas in procidentia the folds are concentrically placed The distinguishing features are given concisely in Table 36

Complications and Sequelae As a result of leakage of mucus, which is frequently present in hemorrhoidal disease, pruritus of the anal and perianal region is not uncommon Prolapse of the rectum is not unusual, since the mucosa is literally dragged down by the protruding hemorrhoids Added to this are the muscular atonia and tissue relaxation that take place in long standing cases In the same manner, procidentia may develop Frequently abscess, fistula, fissure and extensive ulceration complicate this condition Small soft fibromata occasionally may originate in the hemorrhoidal mass [9, 7, 80] Many instances of carcinoma arising in hemorrhoids have been reported [29, 31, 3, 3, 4, 8, 61, 71, 83, 91, 100, 109, 118, 1, 1, 127] the occurrence of sarcoma has also been cited [46] An infected thrombus period of time than from a single hemorrhage Secondary portal pyemia may be mentioned also Constipation and flatulence anorexia and weakness may occur reflexly Seminal emissions termed spermatorrhea' [74] may be incited by compression of the seminal vesicles by the hemorrhoids during the act of defecation, sexual impotence has been listed as a sequela under some conditions [2] Bladder dysfunction such as frequent and painful urination, and certain menstrual disorders are not uncommon Likewise, lumbosacral pains may develop as the result of hemorrhoids Cases of rheumatism also have been cited [4] Nervous irritability as evidenced by languor, fatigue, vertigo and restlessness, as well as periods of morbid depression, is often encountered [11]

Treatment The treatment of internal hemorrhoids resolves itself into preventive palliative and surgical

The preventive consists of the avoidance of overeating, excessive drinking, straining at stool and the establishing and maintenance of regular bowel habits Of course drastic purgation is interdicted

The palliative treatment as the name

implies, consists of alleviating the discomfort, preventing prolapse and averting hemorrhage Regulation of the bowels is an important factor and may be accomplished by the use of liquid petrolatum, drachms ii to ounce i, once or twice daily to prevent irritation and straining Enemata of warm water or olive oil are beneficial where fecal material is retained in the rectum The diet must be regulated, it should consist of those foods which leave little or no fecal residue Fresh fish, well cooked vegetables and ripe fruits should form the greater part of the menu Highly seasoned foods, condiments and alcohol are interdicted Moderate exercise tends to increase the tone of the supporting tissues in uncomplicated cases Rest in bed with elevation of the hips by means of a pillow beneath the buttocks frequently offers comfort to the patient Compresses wrung out in hot boric acid solution and continuously applied are most beneficial especially where inflammation and edema are present If strangulation exists the above procedure should be followed continuously as it tends to lessen the edema and hasten organization of the thrombus When the patient is able to be out of bed hot sitz baths 110° F three or four times daily are of utmost value Instillations of warm olive oil, 2 to 3 ounces ichthyol 1 ounce of a 25 per cent aqueous solution or fluid extract hamamelis (witch hazel) 1 ounce given night and morning will often minimize the discomfort and retard the bleeding

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℞

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M et ft unguentum
Sig Apply locally

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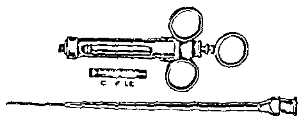


Fig 335 Cook's carpule syringe

the protruding hemorrhoids manually, but only too frequently these masses become irritated and swollen to such a degree that they cannot be returned to their normal site and the physician is urgently sought At this time confinement to bed and the continuous application of compresses wrung out in hot boric acid solution are beneficial measures Instillations of hot olive oil, from 1 to 2 ounces, using a small sized rubber syringe, will allay spasm of the sphincter muscle These should be administered every three or four hours Usually the hot compresses will be sufficient In some instances, an astringent ointment as previously mentioned is helpful Liquid petrolatum in from 2 to 4 drachm doses given by mouth twice daily, is always of value Strangulated hemorrhoids should never be operated upon in their acute phase After the edema has been reduced by rest in bed and the continuous application of hot moist compresses, surgery may be undertaken

Injection Treatment Originally used by Blackwood in 1866 the method was exploited throughout this country by itinerant charlatans and ignorant practitioners with the result that many unfortunate complications arose Naturally the method rapidly fell into disrepute At an early date, however, the value of this form of therapy was keenly appreciated and favorably written upon by Andrews[3] and Kelsey[6, 66, 67] so that largely through their efforts this method has attained its place as an ethical and scientific procedure Opinions, both adverse and favorable can be found strewn upon the pages of medical literature Today the injection treatment of internal hemorrhoids is held in high esteem by leading proctologists in this country and abroad in fact it is recognized as an adequate means of therapy in selected cases According to Martin[6] and others,[11, 123] approximately 50 per cent of cases of internal hemorrhoids are suitable for injection treatment The great misfortune is that those not properly schooled in the anatomy of the anorectal region and qualified in the technic are prone to inject hemorrhoids indiscriminately Unsatisfactory results, such as failures and complications, follow incorrect diagnosis, nonobservance of the contraindications and faulty technic Strict adherence to every detail and utmost care must be exercised if one is to avoid disaster Initially, it is advisable that the patient understand definitely the merits and limitations as applied to the injection treatment

The Purpose, Indications and Contraindications of the Injection Treatment The injection treatment of internal hemorrhoids consists of depositing some sclerosing solution into the submucosa immediately overlying the hemorrhoidal veins, the purpose of which is to shrink the pile mass by obliterating the varicosities with fibrous tissue Its use is indicated only in the internal variety of hemorrhoids when small or of moderate size and uncomplicated This treatment is contraindicated (1) in all external hemorrhoids, including skin tags (2) in the presence of marked fibrosis of the internal hemorrhoids, (3) in complicated cases where inflammation and prolapse are marked, or in those which are thrombotic, strangulated or ulcerated, (4) in the presence of associated pathology such as fissure, abscess, fistula, tumors, cryptitis, proctitis and phlebitis and (5) in the presence of a spasmodic or a markedly contracted sphincter muscle which is usually indicative of infection Hemophilia has been mentioned also as a contraindication[86] Runyeon[10] divides the injection treatment of internal hemorrhoids into three stages, as follows ' In the first, where there is no protrusion but where the patient has occasional bleeding with definite masses of varicose veins noted on using the speculum, will be

found the best field for the use of the injection treatment This is the ideal type of case in which rapid and fairly permanent results may be expected In the second stage when the hemorrhoid protrudes with most of the bowel movements a different problem presents itself Since there is more fibrous tissue present and the venous tumors are larger cure by the injections is less likely to be obtained In this stage it is wise to frankly inform the patient that while in a certain number of cases symptomatic relief may be obtained the masses be shrunken sufficiently to prevent prolapse and the bleeding be checked it is probable that little or at the most only temporary relief may be obtained and that operation must eventually be considered The third stage of internal hemorrhoids admits of no treatment other than operation to obtain relief The hemorrhages that are sometimes so violent may frequently be checked by injection treatments but this relief is only temporary sufficient to build up the blood strength of the patient to prepare him for operation

Armamentarium The armamentarium necessary for this treatment is a suitable anoscope syringe and needle sclerosing solution and good light Any type of syringe may be used for this injection treatment provided it meets the necessary requirements and can be conveniently handled by the operator One that is easily cleansed inexpensive and of durable glass should be selected Either a tuberculin or the ordinary Luer syringe is suitable for this purpose especially since standard needles may be attached A needle that is sharp of medium bevel and 24 or 25 gauge is preferable For clinic use especially, the Cook's carpule syringe as shown in Figure 335 is ideal The author prefers an all glass, Luer type syringe of three cc capacity with a specially designed crooked neck extension and needle (Fig 336) With this equipment hemorrhoids are easily injected and vision is not obscured

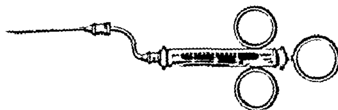


Fig 336 Syringe with crooked extension

Speculum The selection of a speculum is largely a matter of choice and depends mainly on the one to which the physician has become accustomed The Hirschman and Newman anoscope (Fig 61) may be used with satisfaction for hemorrhoidal injections We employ routinely the anoscope designed by C F Martin and find it admirable for this purpose In the absence of an assistant or if the patient is nervous and un-co-operative the self retaining speculum which is a modification of Figure 61 will prove of service In all cases good illumination is essential whether it be direct or indirect The light as shown in Figures 62 and 337 has proved of distinct value for office and clinic use It is inexpensive adaptable to any collared anoscope and does not obscure vision or interfere with instrumentation

Solutions for Injection The selection of a sclerosing fluid is important in the injection of internal hemorrhoids Quinine and

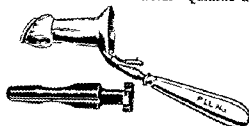


Fig 337 Electric lighted self retaining proctoscope

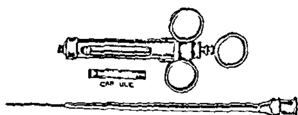


Fig 335 Cook s carpule syringe

the protruding hemorrhoids manually, but only too frequently these masses become irritated and swollen to such a degree that they cannot be returned to their normal site and the physician is urgently sought At this time confinement to bed and the continuous application of compresses wrung out in hot boric acid solution are beneficial measures Instillations of hot olive oil, from 1 to 2 ounces, using a small sized rubber syringe, will allay spasm of the sphincter muscle These should be administered every three or four hours Usually the hot compresses will be sufficient In some instances, an astringent ointment as previously mentioned is helpful Liquid petrolatum, in from 2 to 4 drachm doses given by mouth twice daily is always of value Strangulated hemorrhoids should never be operated upon in their acute phase After the edema has been reduced by rest in bed and the continuous application of hot moist compresses, surgery may be undertaken

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hydrochloride, the author studied histo pathologically a small series of cases at various periods following the use of the latter In this study the same patient under the same conditions was used when pos sible The quinine and urea hydrochloride into the anus A few circular movements of the finger before the speculum is introduced not only thoroughly moisten the anus and partially relax the sphincter, but assist in gaining the confidence of the patient The speculum is smeared with a water soluble

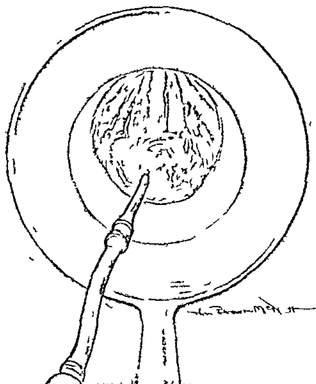


FIG 338 Proctoscopic view of internal hemorrhoid
The needle has been inserted into the submucosa

solution was employed in the same strength (five per cent) and the same dosage in all cases The hemorrhoidal mass injected was carefully tabulated clockwise and subse quently removed under procaine analgesia by the clamp and cautery In general the tissue changes were not unlike those re ported by Pruitt using phenolized oil

Technic of Injecting Internal Hemor rhoids No preliminary preparation of the patient is necessary for the injection treat ment With the patient in the left lateral position (Fig 58) the upper cheek of the buttocks is held by the patient or an assist ant and the well lubricated finger inserted lubricant and gently inserted in a rotary manner Ordinarily this is accomplished more readily if the patient will strain or bear down After the hemorrhoidal tissue is exposed, carefully inspected and the most prominent pile selected for the injec tion the surface of the hemorrhoid is wiped clean with a dry cotton applicator and painted with mercurochrome 5 per cent solution The needle is inserted into the upper portion of the surface of the pile mass for a distance of approximately ⅛ to ¼ inch (Fig 339) It is important to in troduce the tip of the needle into the sub mucosa and not into the varicose veins The

urea hydrochloride, introduced by Terrell,[116] and phenol are standards that may be used with satisfaction in proper strengths These chemical agents, their strengths and more important combinations, are listed as follows

Pruitt[9]

℞
Quininae et ureae hydrochloridum	gr xxii ss
Aqua distillata	fl ℥ i

Terrell[117]

℞
Phenol liquefactum	fl ʒ i
Glycerinum	fl ʒ iii
Aqua	*fl ʒ iv*

Gabriel[4]

℞
Phenol liquefactum	M xxiv
Menthol	gr ii
Oleum amygdalae	q s fl ℥ i

Morley[8]

℞
Phenol liquefactum	M xlviii
Extractum hamamelis	
Aqua distillata	āā fl ℥ ss

℞
Phenol liquefactum	M xxii ss
Oleum olivae	fl ℥ i

More recently quinine and urea dichlorhydrolactate 5 per cent in glycerine, has been used Sodium morrhuate, 5 per cent in benzyl alcohol, may be injected if the patient has an idiosyncrasy to quinine Dobson[38] calls attention to the occasional severe anaphylactoid reaction following its use Reuther and Almquist[97] claim advantages by employing sodium psylliate with 2 per cent benzyl alcohol and concluded that control of bleeding was more effectively produced than with injections of quinine and urea hydrochloride Valerio[123] reports good results in a limited number of cases using a *2 per cent solution of trinitro*phenol in double distilled water The base of each internal hemorrhoid is infiltrated with a few minims of a 1 per cent solution of procaine, and two cc of the freshly prepared trinitrophenol solution are injected into the submucous tissue Injections are given at weekly intervals until the hemorrhoids are sclerosed Although its value is doubted by Lldering[11] and a multitude of others, Boas contends that the results are as favorable as with cauterization or extirpation Considering the frequency with which sloughing is reported and the fact that *the procedure necessitates confinement* to bed for 6 to 8 days, its use can hardly be recommended

Alcohol has been employed[19, 20, 21, 22, 23, 31] for injection but its value is questionable[41, 4] From 0 5 to 1 cc (at the most 2 cc) of 70 per cent alcohol solution is *injected into each hemorrhoid at one sit*ting after which the patient is confined to bed for from six to eight days Although Boas reports results with this treatment as favorable as with cauterization or extirpation, the question arises, why confine a patient to bed by an injection method when an operation with a *known result neces*sitates only one half the period of hospitalization? The frequency with which sloughing is encountered indicates that it is folly to inject such a preparation when ambulant methods can be utilized satisfactorily

Meisen[79, 80, 81] originally employed a 50 per cent solution of *glucose but found the* percentage of recurrence so high that he discarded it as unsatisfactory

For routine use we prefer a preparation of quinine and urea hydrochloride in five per cent solution, as originally suggested by Terrell Others have reported excellent *results with this drug*[8, 1, 14, 15, 16, 8, 34, 60, 90, 98, 101, 105, 106] It is worthy of mention that we compared the effects of solutions of phenol and those of quinine and urea hydrochloride at two different hospitals over a period of three years and found the results far more satisfactory with 5 per cent qui*nine and urea hydrochloride* than with 5 per cent phenol in oil[7]

In an effort to compare the changes between solutions of phenol in oil (as pre*viously determined by Pruitt*[94] *also Ander*son and Dukes[40]) and quinine and urea

treated at regular intervals and not in a haphazard fashion Ordinarily these cases are injected twice weekly without interruption where possible The same hemorrhoid should be treated not more often than from every seven to ten days and only after digital examination has determined the absence of induration Where stronger solutions are used a longer period should elapse between injections

No specific treatment is required following injections although the patient is advised to avoid severe physical strain on the day of injection Cleanliness, of course is essential Liquid petrolatum is prescribed, from ½ to 1 ounce by mouth night and morning during the course of the treatment In each case a daily evacuation if necessary with the help of liquid petrolatum agar agar or milk of magnesia, should be insisted upon but drastic purgatives are interdicted The regular diet is permitted Should protrusion of the injected hemorrhoid occur between treatments the patient should be instructed to replace the pile masses at once by gentle pressure

Advantages There are several distinct advantages to the injection treatment First no pain either during or following the injection accompanies the procedure if properly performed The method requires no anesthetic and is more economical for the patient It is an ambulant procedure and therefore does not necessitate hospitalization No period of disability should occur In fact complications are comparatively few and of less import than following operation Without risk it can be utilized in pregnancy (quinine preparations excepted) diabetes and old age as well as in cardiac renal and pulmonary diseases

Disadvantages Although few the disadvantages may be enumerated as follows (1) limitation of the treatment in that not all hemorrhoids are suitable for injection (see Contraindications) (2) frequency of recurrence estimated at approximately 15 per cent in from two to five years[58, 76, 1, 7] and (3) the misfortune that the procedure is often performed by the unskilled with the result that the complications arising are not merely disheartening to the physician but hazardous to the patient

Complications and Sequelae Owing to trained and experienced operators, the careful selection of cases and the extremely dilute solutions employed, the complications that arise today are comparatively rare In some instances a feeling of syncopy may occur during or immediately following the injection, but this quickly subsides At times, a sensation of heat or slight fullness persists for a few minutes yet rarely does it continue for more than a half hour Pain of a burning or stinging character occurs where the injection is made too close to the anorectal line or where too much solution is injected This may continue for several hours Of course the injection should not be made when the mere insertion of the needle is attended by pain, but if the solution has been deposited, hot compresses and sitz baths will prove of value In an exceptionally small proportion of cases idiosyncrasy to quinine will be noted but this should not deter the physician from using the drug routinely Terrell[111] reports an incidence of 0 2 per cent in over 3 000 cases in our series it was 0 7 per cent We have observed transient impairment of vision in six cases erythema in two and tinnitus in one Pallor vertigo deafness blindness and hoarseness have been reported also temporary retention of urine[73] In such cases phenol or sodium morrhuate should be substituted The carriers or vehicles of phenol are not devoid of complications as shown by Rosser[101] This author remarks "Our observations supported by careful research have convinced us that submucosal tumefaction and at times stricture of the rectum are inherent dangers connected with the use of several oils and it is suggested that mineral oil be avoided completely and that the dosage of other oils (except olive oil which is apparently innocuous) be definitely limited in amount

Hemorrhage rarely occurs unless slough

plunger is slowly pressed until from 8 to 12 minims of the quinine and urea hydrochloride solution are injected or until slight ballooning takes place The surface should appear only slightly ischemic (Fig 338)

sensation, occurs following the injection of too large an amount of solution This may be prevented by stopping the injection as soon as ballooning begins or the surface of the pile becomes slightly blanched

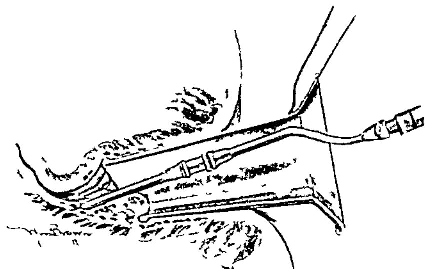


FIG 339 Sagittal view showing needle in the upper portion of the hemorrhoid preparatory to injection of the sclerosing solution

When a sufficient quantity of the solution has been injected, the speculum and needle are withdrawn simultaneously It is unwise to reinsert the instrument once it has been withdrawn

There should be no pain at the time of or following the injection, although a sensation of fullness sometimes occurs This quickly subsides Pain is most frequently caused by making the injection too close to the anorectal line Therefore, if any discomfort is felt during the insertion of the needle, it should be withdrawn immediately and reinserted at a higher level By gently rotating the speculum with the tip of the instrument well above the line of junction the injection can be made painlessly Protruding hemorrhoids should never be injected in situ but should first be replaced Discomfort, often described as a burning

Ordinarily one hemorrhoid is treated at each sitting When they are of small size however, and especially if the patient resides at a distance, the author does not hesitate to inject two hemorrhoids at each visit

There is no hard and fast rule as to the number of injections needed As an average it may be said that each hemorrhoid requires from two to four injections, so that a total of from 8 to 16 constitutes a course Usually at this time the hemorrhoidal masses will have disappeared The site of injection, whether right or left, anterior or posterior, as well as the amount of the solution and the date of administration should be recorded

From four to seven days are permitted to elapse between injections It is of the utmost importance that the hemorrhoids be

other day or twice a week, one hemorrhoid being treated at each sitting

Comment If properly performed this procedure is painless and avoids hospitalization Although good results have been reported,[15, 60, 101] it is questionable whether galvanism offers any improvement over other nonoperative procedures, especially the injection of quinine and urea hydrochloride Yeomans remarks that galvanism does not cure hemorrhoids but is a useful palliative measure The expense of the instrument and the consumption of much time in its application are distinct disadvantages

ELECTROCOAGULATION OR BITERMINAL SURGICAL DIATHERMY It is a known fact that high frequency currents destroy tissue This is accomplished by producing varying degrees of endogenous heat because the tissues offer resistance to the current flow It is produced by connecting one terminal of the d Arsonval solenoid to an ' indifferent metal electrode which is brought into contact with the arm or back of the patient The other terminal is attached to a smaller electrode which is spoken of as the 'active electrode' The current generated is of low voltage high amperage and high frequency

Technic With the patient in the lithotomy position and preferably under general anesthesia the indifferent electrode (sheet of block tin or Crooke s metal 8 inches square) is placed under the patient s buttocks and connected to one terminal The active electrode usually the Bierman hemorrhoid clamp[17] is attached to the other terminal This clamp consists of two parallel heavily insulated electrodes The hemorrhoid to be treated is grasped with hemostats and the clamp applied in the long axis of the bowel The current is turned on by means of a foot switch until the pile mass is fused by coagulation That portion distal to the clamp is excised with scissors Upon removal of the clamp only a thin stump remains

Comment There is no doubt but that this procedure is attended by good results in uncomplicated hemorrhoids but it is certainly not ideal for routine use Neither is it rightfully to be considered an ambulant method The apparatus is both expensive and cumbersome

ELECTRODESICCATION OR UNITERMINAL, HIGH FREQUENCY METHOD Originally devised by Clark,[3-, 33] this form of treatment is for the purpose of devitalizing abnormal tissue by means of heat of just sufficient intensity to cause dehydration or desiccation A monoterminal current, usually an Oudin type generated by a high frequency machine, is employed Some writers, including Gorsch[50] Warshaw[1, 4] and Arnheim,[4] are most enthusiastic with the results obtained in selected cases

Technic The patient is placed in the lithotomy position and an anesthetic administered The hemorrhoid is individually grasped with a hemostat and a suitable clamp loosely applied without crushing The needle, held in an insulated handle is inserted into the pile mass proximal to the clamp for hemorrhoids of large size For those of medium size, the needle is brought into contact with the pile, whereas in smaller ones the needle is held a short distance from it

Comment Although the procedure is advocated for both internal and external hemorrhoids fewer complications would be observed were the method confined to those of the internal variety The formation of the ensuing slough which tends to bleed and become infected is a distinct disadvantage In addition there is after pain which is frequently severe Kleckner[0] sums up the use of electricity as follows 'This method is safe in experienced hands It requires expensive equipment and thorough training to accomplish in a roundabout way what can be done more easily more quickly and equally as well by such certain methods as injection and operation "

Surgical Treatment The purpose of surgical intervention is to remove the vascular tumors This may be accomplished by a variety of methods modifications of which are most numerous Essentially, all involve but two principles of application

ing has taken place Slight oozing, however, is not uncommon In part, this may be avoided by the withdrawal of the speculum at the same time as the needle This re

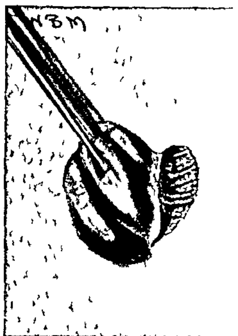


Fig 340 The external hemorrhoid is drawn medially and incised around its junction with the perianal skin

lieves the tension placed upon the pile mass by the tip of the anoscope and permits the rectal walls to collapse which serves to exert slight pressure and prevent bleeding

Sloughing unfortunately is relatively common especially when the procedure is performed by the unskilled It is due usually to the use of an excessive amount of the solution, to too strong a solution or to making the injection too close to the anorectal line For this the instillation of warm olive oil or the insertion of a small strip of gauze soaked with dichloramine T is recommended Bleeding is not infrequent where sloughing occurs in fact profuse hemorrhage may complicate the picture In such cases pressure by means of a petroleum jelly gauze plug, or even ligature may be necessary Some consider sloughing a minor sequela, but it should be avoided in that complications of more serious import may ensue, such as ulceration, proctitis, stricture,[90] abscess and fistulae Campbell[30] has recently called attention to serious complications following injection treatment In 22 cases observed over a 10 year period there were demonstrated 13 cases of fistula and 9 cases of slough He decries the apparent apathy of many authors regarding this point Yaker[106] also makes a plea for caution in the injection treatment He reminds us that too superficial injection or too much solution are the basic causes for resulting complications O V Gass recently reported a case of mesenteric thrombosis following the injection treatment Death from liver abscess and pulmonary infarction has been cited[3, 94 … 110]

Electricity Galvanism The use of galvanism in the treatment of hemorrhoids is based on the theoretical consideration that a galvanic current, representing a continuous flow of electrons, exhibits polarity effects because of its unidirectional character[36] Diametrically opposite physical effects are obtained at the two poles It is claimed that the negative pole, or cathode, induces a thrombosis of the hemorrhoidal veins whereas the positive pole, the anode brings about coagulation and dehydration[62–63] The procedure may be employed in uncomplicated hemorrhoids of the internal variety

Technic The patient is placed in the left lateral position and the negative pole attached to a large, moist pad and either strapped or simply laid on the abdomen The positive pole is fitted to the needle electrode By means of a speculum, the hemorrhoids are brought into view and the needle electrode is inserted into the uppermost part of the pile selected The current is turned on and gradually increased by means of a rheostat until the milliammeter registers from 10 to 15 About 15 minutes is consumed at the end of which time the hemorrhoid is very dark or almost black in color It is important to turn off the current before the needle electrode is withdrawn in order to avoid the disagreeable sensation produced by the sudden breaking of contact Treatments are given every

that it offers several distinct advantages For a male patient placed in the lithotomy position, the scrotum is held from the operative field by means of a Drueck binder[39] This consists of a sterile towel wrung out in sterile water and encircled about the margin of the scrotum The towel is clamped above the base of the penis with a hemostat and the overhanging towel laid over the lower abdomen The anal canal and lower rectum are swabbed carefully with an aqueous antiseptic solution and the perianal aspects widely painted with an alcoholic solution such as cepryn The patient is then draped for the operation

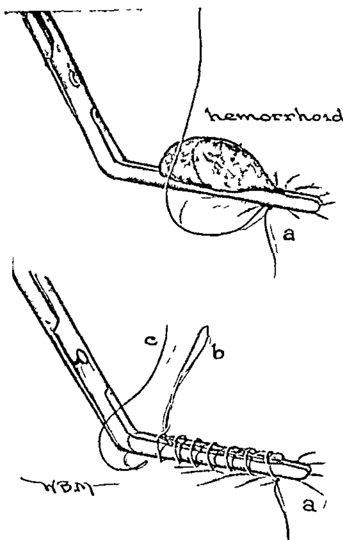


FIG 342 Earle s operation The Earle clamp is placed on the pile at its base Following excision of the hemorrhoid a continuous suture is passed over and under the clamp as shown (Redrawn from Bickham)

METHODS OF PRESENTING INTERNAL HEMORRHOIDS The writer has frequently witnessed the difficulties encountered by the occasional operator in demonstrating internal hemorrhoids at the time of operation For this reason a few of the usual methods are described Ordinarily, internal hemorrhoids will protrude into the anal lumen sufficiently to permit them to be grasped readily by hemostats They may be brought into view by everting the anal

namely, cauterization and ligation, although the latter is subdivided as shown in the following pages

PREOPERATIVE PREPARATION When the operation is to be performed in the morning, the patient is admitted preferably on the afternoon of the previous day A saline enema is administered that evening at 6 P M No laxatives are given although the patient is permitted a light supper For nervous individuals especially, a mild sedative such as phenobarbital gr ½ or nembutal gr 1 ss is advocated that night No breakfast, enema or laxative is permitted the morning of the operation Three hours before operation the perineum is shaved and cleansed with soap and water, a pad moistened with boric acid solution is held in proper position by means of a T binder

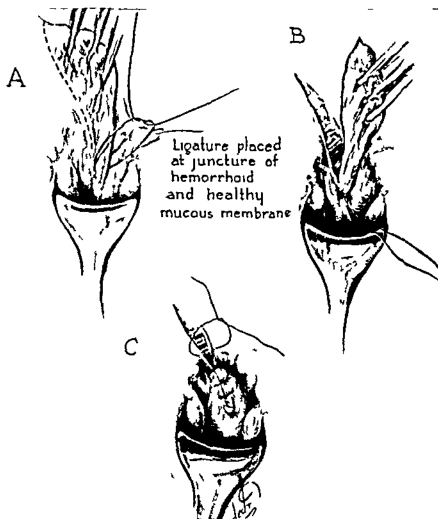


FIG 341 (A) The hemorrhoidal tissue has been divided at its margins and elevated with clamps A ligature is placed at the junction of the hemorrhoidal base and healthy mucous membrane (B) Ligature is in place and hemorrhoid is being excised (C) The base of the hemorrhoid is sutured interruptedly or continuously, as is preferable as far as anorectal line No sutures are employed to approximate the skin

POSITION OF THE PATIENT This is largely dependent on the choice of the operator the dorsal (lithotomy), left lateral (Sims), or inverted (jackknife) positions being used Ordinarily the author employs the inverted or jackknife position under low spinal analgesia and is firmly convinced

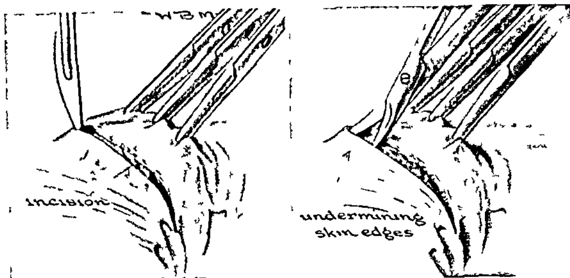


FIG 344 *(Left)* Elevation of hemorrhoid and skin incision *(Right)* Showing mobilization of adjacent skin (Bacon, H E J M Soc New Jersey 38 636)

over the clamp until the stump is com pletely sutured (Fig 342) It is important not to draw this suture too tight as in that case the clamp cannot be slipped through easily The clamp having been withdrawn the suture is now drawn tight and tied at its distal portion with a running knot Other hemorrhoids are treated in like manner

Author s Method[1 8 10 10] In many clinics in various states the surgical treat ment of hemorrhoids is effected without the use of any type of clamp While no single method is employed routinely our prefer ence is to use the Buie Smith clamp which these investigators have themselves dis carded during the past few years Like all procedures the purpose is to remove the existing hemorrhoidal tissue and subcu taneous veins immediately adjacent The author[1 9 1–4] is firm in his belief that while the pain following hemorrhoidectomy is due to many factors most important is trauma to part of the external sphincter muscle at the time that the hemorrhoids are clamped Even where no clamp is used the muscula ture is often inadvertently included in the suture This method consists of wide dissec tion of each hemorrhoid and its bed includ ing the adjacent subcutaneous veins freeing the sphincter muscle from the pile bed clamping the base of the hemorrhoidal mass and the insertion of an inverted mattress suture beneath the clamp

Technic[130] Under low spinal analgesia with the patient in the jackknife position the anorectum is cleansed and the perianus prepared

After appropriate draping the buttocks are retracted by clamping the skin to the edge of the mattress using small towel clips joined by a stout rubber band A Smith or Hill Ferguson speculum is introduced and the hemorrhoidal excrescences identified Each pile mass in its respective quadrants is grasped by means of curved Rankin hemostats Additional hemostats are ap plied to the hemorrhoid to bring into view as much as possible without undue tension These are held together with a rubber band Where external hemorrhoids conjointly occur a small elliptic incision is made on one lateral side of the hemorrhoid in such a manner that it begins at the anorectal (pectinate) line and is carried to a point one half inch beyond or distal to the tip of the external pile mass The edge of the incised skin is elevated with tissue forceps and separated from the underlying tissue with small blunt tipped curved scissors (Fig 344) The opposite side of the hemor

margin with Pennington hemostats or by inserting a single valve speculum and drawing down the hemorrhoids with hemostats Buie inserts an anoscope and pushes a strip of gauze through its lumen The scope is

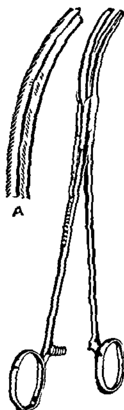


Fig 343 The Buie Smith crushing clamp

withdrawn and the gauze slowly pulled out, which everts the hemorrhoidal masses in *their respective* quadrants These in turn are caught and drawn down

Methods of Surgical Technic *Ligature Method* As originally designed[103] this method was especially applicable for pedunculated hemorrhoids It consisted in throwing a ligature around the base of the pile, the hemorrhoid being sloughed off by the resulting strangulation The only advantages of such a procedure is that hemorrhage is avoided Excision of the pile mass after ligature was soon practiced [116] and is continued today with slight modifications It may be utilized in internal, external or combined hemorrhoids (Fig 341)

Ligation and Excision Hirschman[8,7] devised a procedure which has stood the test of time and although many modifications are in practice, the principle remains the same

In this method, the skin surrounding the entire anal circumference is grasped at four equidistant points with Pennington triangular hemostats and the lower extremity of each dependent hemorrhoid is pulled down on the stretch A ligature is passed through the mucous membrane on one side down to the base of the hemorrhoid and around to the opposite side in such a way as to include the upper half of the mucous membrane covering the pile This ligature is placed at or immediately above the junction of the hemorrhoid and healthy mucous membrane and firmly tied An elliptic excision of the hemorrhoid is made in the longitudinal axis extending down to the distal extremity of the pile The connective tissue and blood vessels are dissected free and cut off one quarter inch from ligature The lower blade of the scissors travels along the sphincter and the upper blade directly beneath the mucosa One or two sutures may be introduced to approximate the cut edges of the mucosa or el e the pedicle is sutured to the subcutaneous tissue Each remaining hemorrhoid is treated in a similar fashion, after which the external skin folds are excised radical to the anus

Clamp, Excision and Suture Earle s Method[41 43] Originally conceived by Mitchell[87] this method embodies clamping each hemorrhoid at its base and excising all proximal tissue, after which a running suture is passed beneath and then over the clamp

The hemorrhoids are pulled down by means of hemostats The hemorrhoidal clamp is placed at the base of the pile in the long axis of the bowel and a suture of catgut is inserted at the uppermost border of the hemorrhoid, immediately beneath the tip of the clamp The suture is firmly tied and, as the pile above the clamp is excised, a continuous suture is passed beneath and

Fig 346 (A) Clamp is placed longitudinally around the base of the hemorrhoid, after which hemorrhoidal tissue is excised (B) The end of the suture has been placed at the summit of the hemorrhoidal base beneath the clamp and tied A running suture is then continued beneath the clamp and tied at the anorectal line

ping is avoided and the edges are accurately approximated However it does consume a few minutes longer During the past few years the use of the cellophane tube drain has been discontinued and we are frank to admit that our patients seem more comfortable By the same token the employment of prolonged analgesic solution has been omitted from our armamentarium without appreciable change

Clamp and Cautery Method[37] This procedure consists of drawing the pile masses well outside the anus and applying a clamp after which the hemorrhoidal tissue distal to the clamp is excised and the stump seared with the actual cautery at red heat Many consider this method obsolete and

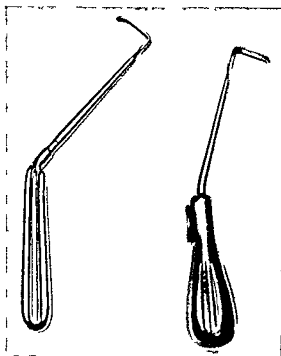


Fig 347 Small angular retractors employed to displace sphincter muscle bundles in performing hemorrhoidectomy

rhoid is treated in a similar fashion The hemorrhoid is now elevated and blunt dissection is begun at the apex where the two incisions are joined The adjacent veins, which have been freed on each side, are now drawn medially and the operator continues with the blunt dissection on the surface of the external sphincter muscle When the inner edge of this muscle is encountered, a small right angle retractor is placed so as to draw the muscle gently from the field of operation (Fig 345) A Buie Smith hemorrhoidal clamp is now placed on the internal hemorrhoidal mass in the longitudinal axis of the bowel and the pile cut away A suture of No 0 chromic catgut on a small curved needle is introduced one quarter inch from the tip of the clamp and tied—the free end to serve as an anchor The base of the hemorrhoid is now sutured beneath the clamp from side to side and continued until the edges of the mucous membrane are approximated (Fig 346) The clamp is removed the muscle permitted to assume its normal location and the suture tied at a point corresponding to the anorectal line Each hemorrhoidal excrescence is treated in like manner

In this procedure the continuous suture may be placed under the clamp as described above, after the method of Siegfried, or over the clamp as originally designed by Earle Our preference is the former, since it is easy to perform, 'slip

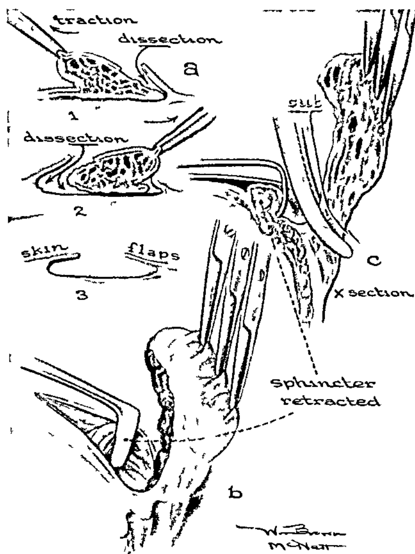


Fig 345 Steps in the operation (a 1) Shows dissection of one side of external hemorrhoid with preservation of adjacent skin This step prevents subsequent stenosis Besides the small veins and thrombi are included in the dissection (a 2) Opposite side of external hemorrhoid treated in similar fashion (a 3) Here the hemorrhoidal bed has been evacuated (b) The external portion of the hemorrhoid has been elevated from its bed Sphincter muscle bundle retracted to prevent its inclusion in clamp or suture (c) Clamp placed longitudinally on hemorrhoidal pedicle (Bacon H E J M Soc New Jersey 38 636)

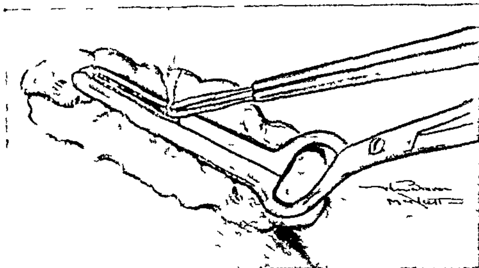


Fig 350 After wet gauze is placed beneath and around the clamp the Paquelin cautery is applied to the stump of the hemorrhoid until it is well seared

will be noted below and between the hemorrhoids just removed This is picked up with forceps and a small wedge removed with scissors as suggested by Bodkin

Plastic Method Fansler and Anderson [47, 48] Based on the original Whitehead operation but without its usual deformity and consequent inconveniences, this procedure consists in removing the thrombotic and varicosed hemorrhoidal vessels after which the normal lining and appearance of the anal canal are restored It is especially intended for those cases in which there is a complete prolapse and thrombosis of the entire ring of internal and external hemorrhoidal vessels

With the patient in the jackknife position and preferably under spinal analgesia the outer ring is retracted and the sulcus dividing the squamous from the columnar epithelium exposed The internal portion of one of the hemorrhoids is grasped and an incision made at the juncture of the two types of epithelium The outer margin of the incision is grasped with Allis forceps and the mucosa and skin dissected outward to the normal skin leaving a long flap of free mucosa and skin On the internal portion of the hemorrhoid the thrombotic tissue is dissected upward as far as the margin of normal mucosa This tissue is removed All other thrombotic vessels are now dissected out until the sphincter muscle is exposed This process is repeated around the entire anal circumference The anus is now surrounded by several flaps of anal skin which are attached at their outer borders and an inner ring of normal rectal mucosa

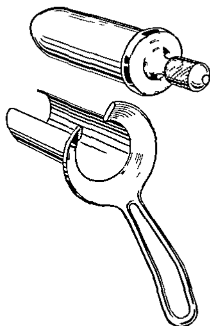


Fig 351 The Fansler operating speculum

one goes so far as to say that it is distinctly less surgical than are the strictly operative methods With the latter view the author is in hearty accord It must be admitted, nevertheless, that just as good results attend its use as with any other method

Each pile is grasped at its lower pole by means of a curved Kocher hemostat and drawn taut in its respective quadrant Additional hemostats are used to grasp each pile, one above the other, approximately one half inch apart and at an angle of forty five degrees in the long axis of the bowel Where only internal hemorrhoids are present the clamp is applied at the base *of each pile in the long axis of the gut, but* if there are external hemorrhoids or any anal redundancy, a V shaped incision is first made with scissors just through the skin around the base of the external pile as far as the anorectal line on each side (Fig 340) The hemorrhoidal clamp (Fig 348) is then tightly applied in this groove in such a manner as not to embrace any additional anal skin One or two strips of wet gauze are wrapped around and beneath the clamp to prevent burning of the adjacent tissue All hemorrhoidal tissue proximal to the clamp is excised with curved scissors (Fig 349) so that a ragged stump remains A Paquelin cautery at dull red heat is applied directly in a to and fro motion until a dark brown, charred stump remains (Fig 350) The clamp is then removed Each presenting pile mass is treated *in a similar manner, care* being taken to leave an island of normal skin between each area removed Any ragged edges or teats of anal skin are excised with scissors Not infrequently, a fullness or a fold of skin



Fig 348 (*Left*) The C F Martin clamp (*Right*) Hemorrhoidal clamp

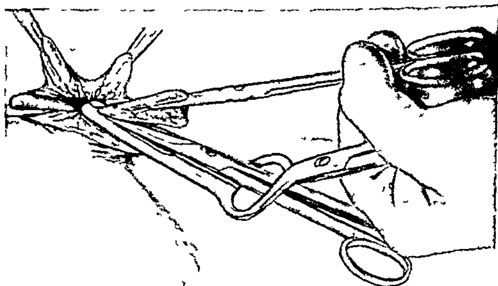


Fig 349 The hemorrhoids have been drawn outward in their respective quadrants The portion of the hemorrhoid proximal to the clamp is being removed by scissors

occurred In such cases the dressings are literally saturated An urgent desire for stool and the classical signs of hemorrhage, pallor, cold and clammy skin thirst and thready pulse, are usually present Firm pressure with gauze against the operative area, or the insertion of a large petrolatum gauze plug through the anus and into the lower rectum will usually suffice Where these methods fail the patient is anesthetized and the spurting vessel ligated

Retention of Urine This is not uncommon during the period from the first 24 to 48 hours Removal of packing if such has been used, change of position and the application of heat to the perineum and over the bladder may relieve this distressing symptom Prostigmine, syntropan and beer, as previously mentioned are employed routinely Catheterization at intervals of twelve hours must be resorted to in some cases

Anal Stenosis Anal stenosis is occasionally encountered following operation It results more often from the removal of too much anal skin than from an excess of rectal mucosa In these cases of stenosis it will be noted that the narrowing occurs at the anorectal line immediately below it or at the anal margin Stricture of the rectum which represents an organic narrowing of the rectal lumen due to an intramural and perimural infiltration of fibrous tissue, is seldom if ever the direct result of an operation for hemorrhoids Anal stenosis may be avoided by leaving an island of anal skin between the hemorrhoidal areas removed and after operation by careful insertion of the well lubricated finger at periodic intervals

Skin Tags These not infrequently follow hemorrhoidectomy whether performed by the ligature or clamp and cautery method Lockhart Mummery mentions that they occur in about 6 per cent of all cases Occasionally they give rise to much mental discomfort in that the patient is prone to believe the operation was incomplete or improperly executed In such cases it is advisable to impress upon the patient the value of leaving small areas of skin between the hemorrhoids removed in order to insure good healing thus obviating the danger of subsequent stenosis Ordinarily skin tags shrink to a considerable degree, but it is often expedient to remove them rather than incur any dissatisfaction on the part of the patient When excision is desired, a wheal is made just distal to the skin tag with a few minims of procaine solution, using a small hypodermic needle A needle of larger caliber is inserted through the wheal and advanced slowly beneath the tag until sufficient solution is injected to cause analgesia, and then the tag is snipped off with curved scissors Firm pressure momentarily applied will usually control the bleeding A gauze pad is placed against the area and supported by means of adhesive straps or T binder

Perianal Edema Perianal edema frequently occurs as the result of local analgesia improperly performed or of trauma or it may be due to a portion of the anal skin being caught in the ligature or hemorrhoidal clamp The continuous application of compresses wrung out in hot boric acid solution and later hot sitz baths usually will cause most of the swelling to subside

Fissure Fissure is occasionally encountered following operation In a measure it may be avoided by instituting means at operation to prevent stenosis The incidence may be further diminished by careful postoperative care especially the periodic insertion of the lubricated finger Temporary use of mineral oil and metamucil are adjuncts as well as hot fomentations Usually a simple divulsion under anesthesia will relieve the most intractable case following hemorrhoidectomy

The most disastrous complication following operation for hemorrhoids is pulmonary embolism, a few instances of which have been recorded in the literature [87, 11, 113] Liver embolus has been recently reported by Martin and Wenzel [7]

presents itself at the lower margin of the anal canal The rectal mucosa is allowed to retract and a Fansler *operating speculum* inserted (Fig 351) Two sutures of 00 chromic catgut are passed through the outer margin of one of the skin flaps and needles are left on the sutures The rectal mucosa *is grasped with Allis forceps at a point* directly internal to the anal flap The sutures attached to the skin flap are now passed through the rectal mucosa and a portion of the rectal wall at a point repre*senting the normal anorectal margin* These sutures are then tied, this portion of the anal canal being thus restored to its normal state The same process is repeated about the rest of the anal canal, usually four or *five flaps being utilized to complete the* procedure

Externo Internal Hemorrhoids

An externo internal hemorrhoid (mixed or combined) is a combination or blending of the external and internal varieties and appears as a baggy swelling containing varicosities of the radicles of the inferior and superior hemorrhoidal veins The lower portion is covered by modified anal skin, whereas the upper portion is covered by mucous membrane At the junction of these two types of epithelium (columnar above and squamous below) there is a ridge known as the anorectal line In a mixed hemorrhoid, it will be noted that its upper portion (mucous membrane) is red or red*dish purple in color and more or less globu*lar in shape while below it is flesh-colored and usually ovoid in shape The etiology, symptoms pathology and treatment have been discussed in the preceding pages

POSTOPERATIVE TREATMENT

With few exceptions, a routine procedure is employed *Upon return of the patient* from surgery, the foot of the bed is elevated for six hours where light spinal (hypoboric solution) has been used With the return of sensation compresses wrung out in hot boric acid solution are applied In this respect it has been found convenient to have an electric hot plate and the boric *acid beside the bed so that hot compresses* can be replaced frequently by the patient Liquids, supper and smoking are immediately permitted

Routinely, prostigmine 15 mg and syn*tropan 200 mg are given every four hours* until the patient voids For a similar reason, beer (three bottles daily), is permitted Thiamin chloride, 50 mg thrice daily, is administered to lower the incidence of post*spinal headache During the first twenty* four hour period, morphine sulfate, gr 1/6, or dilaudid, gr 1/30, is used for pain only The day following operation, the patient is permitted out of bed and hot sitz baths *are instituted* (See p 994, Chap 27, Preoperative and Postoperative Treatment of Patients Undergoing Minor Surgical Procedures) On the following morning (second postoperative day), a warm olive oil enema *is administered* using a small, soft rubber catheter Metamucil, one dram in one glass of water, twice daily, and mineral oil, one half ounce nightly, are given Milk of magnesia, from one half to one ounce or petrolagar may be substituted, if desired A regular house diet is begun on the morning of the first day after operation Ordinarily all patients are *discharged from* the hospital on the third postoperative day Throughout the hospital period, the operative wound is painted daily with gentian violet, 1 per cent solution

COMPLICATIONS AND SEQUELAE

Hemorrhage is an infrequent complication, yet is occasionally met with *during* the first 24 hours Secondary hemorrhage is extremely rare and occurs usually between the seventh and tenth postoperative days Exposure of a vessel as the slough comes *away and slipping or too early* separation of the ligature are the usual causes Although hemorrhage following hemorrhoidectomy is for the most part concealed, *frequent in*spection of the perianal dressings will serve as a good index where marked bleeding has

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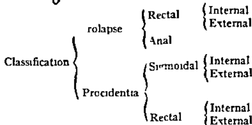
CHAPTER 17

Prolapse and Procidentia

I AND DESCRIPTION

)plied to the anorectal area le`cent of the mucous mem tum with or without pro the anal orifice Procidentia as the abnormal descent s of the rectum with or on through the anal orifice

(1)



Prolapse as generally applied is an inclusive term u ed to denote any form or type of bowel descent independent of its location (anus rectum or colon) Various limiting terms have been prefixed first second and third degree design from above and below, which ad confusing and difficult to inte described the difference and procidentia lies in bowel involved The former, to the downward disp

cous membrane alone whereas the latter procidentia is assigned to the downward displacement of all the coats[1 67 100 133] The site involved is expressed anatomically For example prolapse of the rectal mucous membrane is termed rectal prolapse and eversion of the modified anal skin is termed anal prolapse If both are present as is often the case the combination is designated as anorectal prolapse[5] Similarly procidentia of the rectum is termed rectal procidentia and procidentia of the sigmoid colon is termed sigmoidal procidentia In the latter also denoted as pelvic procidentia or intussusception[77 114] the lower portion of the sigmoid colon with all its coats, including the peritoneal layer is invaginated or telescoped into the rectal ampulla In either case of prolapse or procidentia except anal eversion protrusion into the lumen of the rectum is designated as internal," and through the anal aperture, as external"

INCIDENCE

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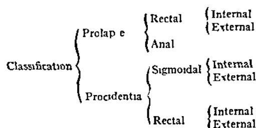
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CHAPTER 17

Prolapse and Procidentia

DEFINITION AND DESCRIPTION

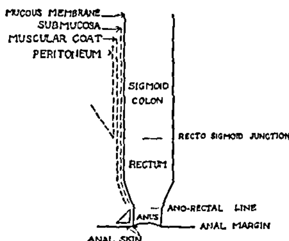
Prolapse as applied to the anorectal area is the abnormal descent of the mucous membrane of the rectum with or without protrusion through the anal orifice. Procidentia may be defined as the abnormal descent of all the coats of the rectum with or without protrusion through the anal orifice (Fig. 352). (V)



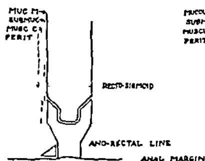
Prolapse as generally applied is an inclusive term used to denote any form or type of bowel descent independent of its location (anus, rectum or colon). Various limiting terms have been prefixed as first, second and third degree, designated both from above and below, which additions are confusing and difficult to interpret. As here described, the difference between prolapse and procidentia lies in the coats of the bowel involved. The former, prolapse, refers to the downward displacement of the mucous membrane alone, whereas the latter, procidentia, is assigned to the downward displacement of all the coats.[15, 67, [illegible], [illegible]] The site involved is expressed anatomically. For example, prolapse of the rectal mucous membrane is termed rectal prolapse, and eversion of the modified anal skin is termed anal prolapse. If both are present, as is often the case, the combination is designated as anorectal prolapse.[5] Similarly, procidentia of the rectum is termed rectal procidentia, and procidentia of the sigmoid colon is termed sigmoidal procidentia. In the latter, also denoted as pelvic procidentia or intussusception,[[illegible], 114] the lower portion of the sigmoid colon with all its coats, including the peritoneal layer, is invaginated or telescoped into the rectal ampulla. In either case of prolapse or procidentia, except anal eversion, protrusion into the lumen of the rectum is designated as "internal," and through the anal aperture as "external."

INCIDENCE

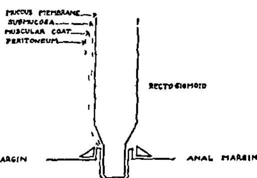
Prolapse is more prone to occur during childhood, whereas procidentia is most frequent in adult life, especially in those of advanced years. When present in the active period of life, some pre-existing pathologic



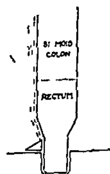
NORMAL RECTUM



INTERNAL

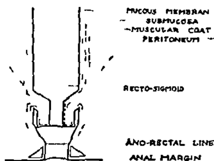


EXTERNAL

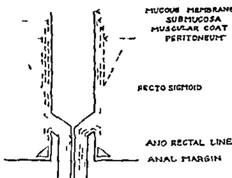


ANO RECTAL

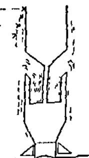
PROLAPSE



INTERNAL



EXTERNAL



SIGMOIDAL

PROCIDENTIA

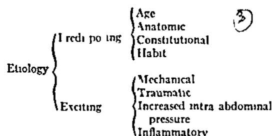
FIG 352

process in or about the rectum is usually to be found Apparently women are more often subject to this condition than men Its causes are enumerated under Etiology

ETIOLOGY

Since prolapse is frequently the fore runner of procidentia, and since, in general,

the same factors produce these two conditions, all will be included under a general etiologic table, except where special mention is indicated It should be borne in mind however, as Martin[87] stated that essentially prolapse is caused by an increased motility of the anal skin or rectal mucosa on the underlying tissue, while in *procidentia the main defect seems to be* one of stretching out or tearing off or the absence of the normal fascial, muscular or peritoneal supports of the bowel



Predisposing Causes

Age Prolapse is more common in children especially between the ages of one and five years[113] than during the later periods of life In a great measure this is due to the anatomic arrangement of the immature pelvis and organs at this age Also may be mentioned the frequency of debilitating diseases and nutritional disturbances which give rise to absorption of the ischiorectal fat In advanced years because of general debility with impaired circulation emaciation and lack of muscle tone[3] procidentia and in fact prolapse are not uncommon

Anatomic In children the immature development of some of the contiguous structures is a contributing factor Among other causes may be mentioned the absence of the sacral curve[3] the loose fixation of the surrounding tissues of the rectum the high position of the bladder and uterus[136] and the almost vertical course of the rectum In the adult weakness of the pelvic musculature[74] and elongated mesocolon,[66] and an abnormally low lying cul de sac of Douglas[76] are regarded as important predisposing causes of procidentia Invagination of this pouch through its posterior wall and into the rectum is considered by many[8, 91, 107, 118, 133] as analogous to a hernia of the sliding type

Constitutional Under this heading may be included those diseases which, by prolonged wasting, result in general relaxation of tissue and subsequent impairment of the normal support of the rectum Interference with *the neural mechanism* as in tabes dorsalis, or in fact any condition or disease which produces paralysis or relaxation of the sphincter and levator ani muscles[131] predispoes to prolapse and procidentia The erroneous habit of sitting in an unnatural posture at stool, both during childhood and in adult life, is conducive to straining which may be regarded as an exciting cause of bowel protrusion

Exciting Causes

Prolapse and procidentia may be precipitated by the causes below enumerated, either of themselves or by straining incident to their presence Undoubtedly straining at stool is the most frequent and important etiologic factor, and is usually concomitant with or the result of a protracted diarrheic condition[9] or an obstinate constipation

Mechanical Causes Intrinsic causes refer to those within the lumen of the bowel which drag down its lining, as hemorrhoids, polypi hard costive stools and neoplasms Those of extrinsic origin may be parturition procidentia tumors and displacements of the uterus hypertrophy and tumors of the prostate visceroptosis drastic purgation and intra abdominal tumors

Traumatic Causes Those which bear undue influence such as injuries to the sphincter muscle from careless divulsion or operation, laceration of the perineum, foreign bodies and sodomy should be mentioned

Increased Intra Abdominal Pressure Contributory factors under this heading are those which either physiologically or pathologically, provoke straining such as severe acts of defecation, vomiting coughing, cry

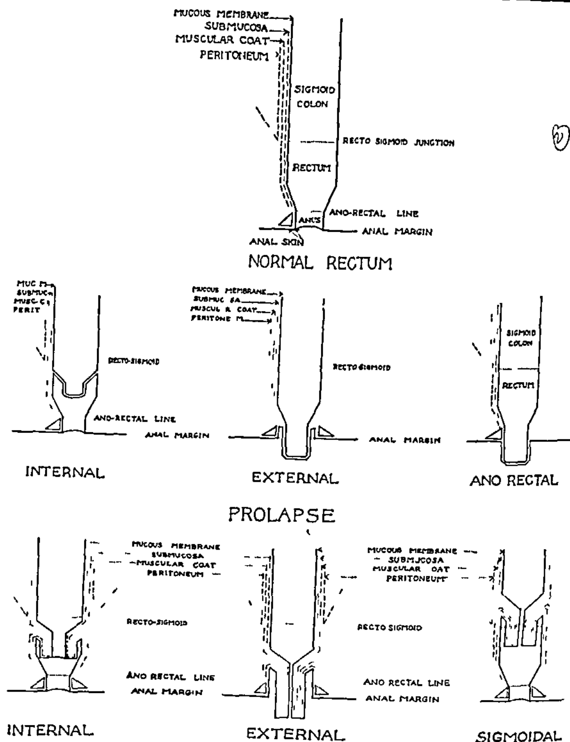


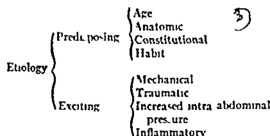
Fig 352

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Increased Intra Abdominal Pressure Contributory factors under this heading are those which either physiologically or pathologically, provoke straining, such as severe acts of defecation vomiting coughing, cry

ing, violent exercise (such as horseback riding),[8] corsets and belts tightly applied and that induced by urethral calculus,[31] stricture,[0] and phimosis[137]

Inflammatory Processes Such may tend toward structural weakness of the individual layers of the rectum, such as proctitis and coloproctitis of various types, and intestinal parasites, especially ascarides[3, 106]

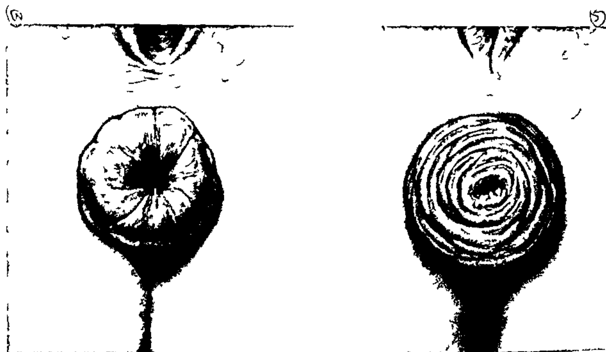


Fig 353 (*Left*) Prolapse showing radiating furrows (*Right*) Procidentia showing striations circularly arranged

PATHOLOGY

Prolapse

In internal prolapse the mucous membrane may be observed as a redundancy or abnormal looseness of the mucous folds of the rectum, with or without apparent pathologic change At times the mucosa will occlude the distal end of the proctoscope and, because of its bogginess may prevent further advancement of the instrument Either a portion of the mucosa or the entire circumference may be involved In appearance it is usually bright red and glistening and is inclined to bleed readily upon slight trauma Occasionally internal prolapse may be noted, on digital examination by its relatively soft consistency It may correspond to a double layer of mucous membrane which may be moved sidewise or pushed upward In all cases the examining finger can be inserted between the prolapse and the intact wall

In external prolapse the protruding rectal mucosa, outside the anal aperture, is characterized by its spherical shape and longitudinal furrows or sulci, which radiate from the center of the anal canal and which are produced by the mucosal lobulations (Fig 354) Initially the mucous membrane is pink or bright red in color, while in children it presents even a more brilliant hue It is moist and glistening in appearance, and minute areas of hemorrhage are frequently observed on its surface Protrusion may occur periodically and accompany the defecatory act, after which it is usually retracted within the rectum At times it requires replacement manually At this stage the surface is covered by a mucous exudate which is thick and viscid in character Later the prolapsus is presented following some effort at straining, and eventually it may protrude on the slightest provocation Usually its progress of descent is gradual and increases with each bowel

PLATE 8







(*Right lower*) W B Procidentia undergoing gangrene successfully repaired (*Right upper*) M E Procidentia corrected by intra abdominal procedure (*Left*) Corrected by intra abdominal procedure

movement to a variable length until replacement is difficult or, as often happens, impossible Should the prolapsus be permitted to remain outside the anal orifice for a period of time, then, because of pressure on the venous return exerted by the sphincter muscle and to some degree by irritation the exposed bowel becomes edematous and presents a deep red color, which is dependent on the amount of venous engorgement The parts become thickened increasing the danger of trauma, from which inflammation erosion and ulceration may ensue Although the complication is very infrequent should the prolapsus be sufficiently constricted by the sphincter muscle strangulation may occur at which time the mucosa becomes gangrenous and is black in color In chronic cases the sphincter is atonic either because of fatigue or some other factor and the prolapse is pale and leathery in appearance owing to continued irritation and repeated replacements On section, varying degrees of looseness are noted between the mucous membrane and submucosa but this is even more marked between the submucosa and muscular coat The latter is somewhat hypertrophied [38] Histologically areas of complete denudation are seen interspersed between which are columnar cells at times of the stratified type [100]

In anal prolapse the modified skin lining the anal canal is everted and appears somewhat congested and edematous In such the anal skin is directly continuous with the perianal skin between which no sulcus is noted (see Fig 352) Usually prolapse of the rectal mucosa is associated in which case the anorectal junction with its semilunar valves is easily discernible [16]

Procidentia

Internal procidentia or the protrusion of all the rectal coats into the lumen of the rectum may be noted by the increase in thickness and the firm consistency of the mucosa (Fig 355) In sigmoidal procidentia all the coats of the sigmoid colon including the peritoneal layer, protrude into the lumen of the rectum Such is rarely presented through the anal orifice,[117] which explains why the condition is frequently overlooked unless symptoms are sufficient to warrant digital and proctoscopic examination Usually it is intermittent in type, but rarely is it completely obstructed Irritation of the adjoining surfaces leads to erosions and ulcerations so that a well developed proctitis often ensues

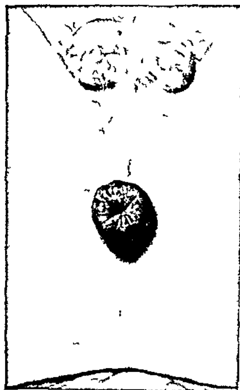


Fig 354 Prolapse of the rectum The radial striations or furrows radiating from the center of the anal aperture can be seen

External procidentia which embodies protrusion of all the bowel coats through the anal orifice is characterized by a series of circumferential folds irregularly placed The protruding mass is oval in shape and thick and firm to the touch As much as 17 *inches*[90] may extend beyond the anus but protrusion of more than 2 or 2½ inches usually contains the peritoneal layer [60] As in prolapse procidentia at first appears *bright red* but later variations of a deeper color ensue As a result of irritation and

sphincteric constriction the parts become congested and swollen, and frequently the circular striations are obliterated The surface is glistening because of the mucous exudate, which is often abundant Scattered erosions are noted and occasionally ulcerations, in which case the discharge is mucopurulent and fetid

In some cases of external procidentia the modified anal skin may be everted or pro

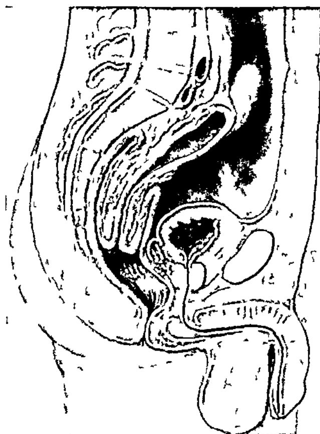


Fig 355 Sagittal section of procidentia of the rectum



Fig 356 Photomicrograph of rectosigmoidal procidentia

lapsed, but the sphincter muscle remains intact and is not displaced Therefore we do not consider that such a condition as anal procidentia can exist

SYMPTOMS

In both prolapse and procidentia a history of protrusion at stool is usually related ating down the lower limbs[41] frequent micturition and flatulence may be associated Constipation[16] is the rule but as the parts become inflamed and ulcerated diarrhea ensues and the stools are accompanied by blood and pus In the presence of strangulation however the pain may be of severe intensity



Fig 357 R R age 71 Procidentia corrected by intra abdominal procedure

by the patient or the mother of the child At first the onset is insidious and the mass recedes spontaneously but later since the condition is a progressive one it may necessitate replacement manually which at times is most difficult Occasionally the *patient may disclose the existence of this* intermittent protrusion for a period of many months or even years and reveal that recently the rectum turns inside out while walking or following acts of straining as coughing or sneezing Discharge of mucus clear and slight in amount is observed early Later owing to irritation from the friction of the mucous surfaces rubbing together bleeding occurs This is usually noted at stool yet is seldom profuse Pain is often described as a bearing down sensation or one of fullness which is aggravated rather than relieved by the use of laxatives A feeling of dragginess in the sacrolumbar region dull aching pains radi-

In prolapse and procidentia of the internal variety or where the protrusion is not presented through the anal aperture the symptoms are even more obscure In such a feeling that the passage is incomplete is not uncommon Blood tinged mucus *is frequently observed at stool* Where procidentia of the sigmoid exists constipation of the obstinate type unrelieved by repeated purgatives is usual[29] The discharge is mucoid and often tinged with blood Pain of a dull aching character referred to the perineum lumbar regions and thighs may be complained of by the patient

DIAGNOSIS

Prolapse

In children a history of protrusion at stool but later occurring after some effort at straining is especially suggestive of prolapse

sphincteric constriction the parts become congested and swollen, and frequently the circular striations are obliterated The surface is glistening because of the mucous exudate which is often abundant Scattered erosions are noted and occasionally ulcerations, in which case the discharge is mucopurulent and fetid

In some cases of external procidentia the modified anal skin may be everted or pro

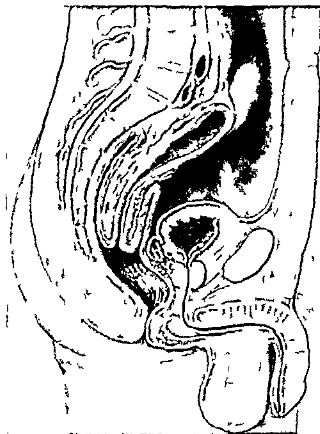


Fig 355 Sagittal section of procidentia of the rectum



Fig 356 Photomicrograph of rectosigmoidal procidentia

thick firm movable and slippery Very frequently when viewed through the proctoscope the lumen of the rectum is totally obliterated by the mass so that the inverted position using a Hanes or Buie table together with mild inflation of air is a helpful adjunct The procidentia may be of variable size and appears quite similar to

DIFFERENTIAL DIAGNOSIS

Among the pathologic conditions to be differentiated from prolapse and procidentia may be mentioned hemorrhoids polyps hypertrophied papillae and malignant tumors Hemorrhoids are rarely observed in children The internal variety have their



Fig 359 B L male 81 Procidentia of 15 years duration Malignant adenoma may be noted at tip of protruding mass Successful operation of procidentia and of growth by intra abdominal resection

normal mucous membrane but usually some degree of congestion erosion and ulceration is noted Sigmoidal procidentia offers the same characteristics except that the sulcus occurs at or above the rectosigmoid junction (Fig 358)

origin immediately above the anorectal line and are usually located in the three characteristic quadrants of the circumference They occur as soft sacculations irregular in shape and somewhat lobulated, with a broad base Internal hemorrhoids are of a

Table 37 Differential Diagnosis

	Prolapse	Procidentia
Age	Usually in children	Usually adults and advanced age
Onset	Less gradual	Gradual
Parts involved	Mucous membrane alone	All coats of wall
Characteristics	Longitudinal furrows which radiate from center of anus Soft and firm Not more than 2½ inches in length Shape spherical	Circular striations irregularly placed More firm and thick Greater diameter and length Condition more chronic Sphincter muscle apt to be atonic Shape oval

Inspection Prolapse through the anal orifice is diagnosed by the longitudinal furrows which radiate from the center of the anal canal and the spherical shape of the protruding mass, which rarely exceeds two inches in length

Digital Examination When gently pressed between the thumb and index finger the prolapse is firm and corresponds to a double layer of rectal mucosa If, as the finger is extended along the outer surface of the prolapse a sulcus is noted between this and the intact rectal wall it is diagnosed 'rectal prolapse' If, however, no sulcus is felt and the outer surface of the prolapse is directly continuous with the skin of the anal margin (anal prolapse), it is diagnosed "anorectal prolapse[89]

Prolapse of the rectal mucous membrane into the lower lumen of the rectum (internal prolapse) is diagnosed by digital and proctoscopic examination By the latter is observed an abnormal looseness or wrinkled swelling of the mucosa involving either part or all of its entire circumference Digital examination may be assisted by having the patient assume the squatting position and strain Here the prolapse may be felt above the hemorrhoidal area as an undue mobility of the mucosa

PROCIDENTIA

Inspection Protruding through the anal orifice, procidentia is diagnosed by a series of circular folds irregularly placed The protrusion is oval in shape and is larger in diameter and extends to a greater length than prolapse

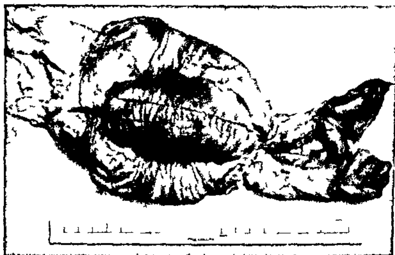


Fig 358 Procidentia of the sigmoid

On palpation the procidentia feels thick and firm, and, as the finger is inserted alongside the outer surface of the protruding mass a sulcus is noted between this and the intact rectal wall In chronic cases the sphincter muscle is atonic Prolapse of the anal skin may be associated in which case no sulcus is noted This, however, is an anal prolapse and represents only an eversion of the lining skin of the anus In such the sphincter muscle is not affected

Internal procidentia i e confined within the rectal lumen, is diagnosed by digital and proctoscopic examination the former being greatly facilitated by the sitting or squatting posture In this way the procidentia may be felt as a protrusion or mass which, on being traced upward appears to involve the entire rectal wall In the sulcus thus formed the finger can usually be swept around the total circumference, while to the touch the procidentia is

therapeutics In brief, all factors which are conducive to straining should be eliminated Hemorrhoids and polyps should be removed and lacerations repaired Helminths such as ascarides may be destroyed by the use of calomel gr 1, or santonin gr 1 to III, given by mouth each day for three consecutive days, followed by a saline enema Rectal injections of lime water or infusion of quassia likewise are beneficial A 1 per cent ointment of thymol given by means of a pile syringe has been recommended

Diet Independent of the patient's age the dietary should be regulated carefully *choosing those foods that are highly nutritious* and which leave but little residue Quantities of fresh fruits should be given and the consumption of fluids should be increased

Defecation The child especially should be trained to have an evacuation at a given time each day and to avoid prolonged sitting on the toilet Stools may be rendered soft by the administration of liquid petrolatum from ½ to 1 oz by mouth and olive oil from 1 to 4 oz by rectum given twice daily The use of a small cold water enema may be advantageously prescribed before each bowel movement[20] In children the recumbent posture is advocated during evacuation of the bowels after which the buttocks may be strapped together with adhesive tape to prevent subsequent protrusion In order to allay tenesmus and diminish inflammation of the mucosa a 25 per cent aqueous solution of ichthyol or 10 per cent krameria may be instilled twice daily into the rectum

Improving Sphincter Tone This may be accomplished by prompt reduction of the protruding mass prevention of its recurrence and by training the patient to contract the anus forcibly several times daily[10]

Constitutional Treatment When indicated the general health of the patient should be improved by suitable tonics such as iron arsenic strychnine phosphorus and cod liver oil Hygienic measures and exercise should receive careful consideration

REDUCTION OF PROTRUSION

One should endeavor to return the extruding gut to its normal position If possible, the reduction should be performed *immediately since congestion of the part* increases proportionately to the duration of the initial protrusion Subsequently replacements are difficult, and continued protrusion enhances muscle fatigue

Method of Reduction Reduction is best accomplished with the patient in the left lateral position The protruding bowel is freely smeared with a water soluble lubricant and pressed *into the rectum by gentle* taxis This is accomplished by inserting the finger into the lumen of the protrusion and carefully returning the mass into the rectum A paper cone wrapped about the finger may be used for this purpose[30, 31] since the paper adheres to the mucous membrane but releases the finger After the prolapse or procidentia has been replaced the finger is introduced into the lumen of the rectum to insure its passage above the sphincter muscles If the protruding bowel is edematous compresses saturated in hot boric acid solution should be applied locally before reduction is attempted Absorbent cotton wrung out in ice-cold water has been suggested but because of the impaired circulation is not to be advised Astringent lotions have been recommended among which may be mentioned 2 per cent alum lead acetate and ½ per cent zinc sulphate[11] Small erosions and ulcerations probably are best treated by the topical application of silver nitrate either in 10 per cent solution or in stick form In cases where the patient suffers considerable pain or the prolonged attempt at reduction may prove disastrous the administration of a *general anesthetic* is indicated The after treatment of reduction consists of confining the patient to bed for a brief stay two or three days and the administration of mineral oil by mouth and warm olive oil by rectum

Electricity has been employed for its tonic effect on the musculature using the



FIG 360 E C, female, age 54 (*Left*) Procidentia has been replaced (*Right*) Showing procidentia of rectum and sigmoid

bluish red color and bleed readily Between each pile is noted an area of normal mucous membrane Polyps are easily recognized in that they usually occur singly Their shape is round or oval and to the touch they feel soft and elastic Most characteristic is the narrow pedicle which is always present Hypertrophied papillae are frequently multiple, and always arise from the anorectal line, whether they extend upward into the rectal lumen or downward through the anal aperture The base is usually broad and pink, while the apex is pointed and of a whitish hue Carcinoma of the rectum is more common after the age of forty The mass is irregular and nodular, the base being broad and fixed The ulcers are deep, the edges raised and the base indurated The discharge is acrid and the odor fetid Biopsy confirms the diagnosis Anal epithelioma is nodular in appearance and excessive granulations are noted The mass is hard indurated and presents reddish violet ulcerations, the base of which is gray Biopsy is positive for malignancy

COMPLICATIONS AND SEQUELAE

Ulceration of the mucosal surfaces may occur from mechanical irritation during the course of the protrusion or from some superimposed inflammatory process In procidentia especially, varying degrees of fecal incontinence are not uncommon, owing to relaxation of the sphincters, so that, because of the annoyance and physical incapacitation extreme irritability may ensue Strangulation is fortunately a rare complication, and is due either to an acute inflammatory process in the bowel itself or to constriction by the sphincter muscles If not relieved, the parts may become gangrenous Even though strangulation is uncommon in procidentia of the sigmoid[115] the involved peritoneal layer has been described as the seat of an adhesive peritonitis[18] Probably the most serious complication is rupture of the protruding rectal wall with evisceration of the intestines,[96] but happily this too, is an infrequent occurrence

TREATMENT

In all cases of prolapse and procidentia it is essential to correct any existing pathologic process or mechanical condition which may have caused or aggravated the protrusion Constipation and diarrhea should be controlled by the instit proper

therapeutics In brief, all factors which are conducive to straining should be eliminated Hemorrhoids and polyps should be removed and lacerations repaired Helminths, such as ascarides, may be destroyed by the use of calomel, gr i, or santonin, gr i to iii, given by mouth each day for three consecutive days, followed by a saline enema Rectal injections of lime water or infusion of quassia likewise are beneficial A 1 per cent ointment of thymol, given by means of a pile syringe, has been recommended

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Electricity has been employed for its tonic effect on the musculature, using the

galvanic, faradic or sinusoidal current to stimulate rhythmic contractions[120] The treatments are given two or three times weekly by means of instruments specially designed for the interior of the rectum[71] The method should be confined to those cases in which surgical intervention is contraindicated, especially in the very weak and debilitated[23]

Treatment by Injection

Hydrochloric Acid Hanes[60, 61] advocated the injection of from 50 to 60 cc of 1 3,000 C P hydrochloric acid solution into the perirectal spaces The inflammatory reaction incident to the injection results in fibrous tissue formation, which aids in retaining the rectal wall in its normal position

Technic By means of a needle, 3½ inches in length, the perirectal structures on the right side are infiltrated with from 30 to 40 cc of ½ per cent novocaine solution With the needle in situ, from 25 to 30 cc of a 1 3,000 hydrochloric acid solution is then introduced The injection is repeated, using similar quantities, on the left side

Comment *Pain is due to the irritating* effects of the HCl The parts should be well massaged and pounded over a considerable period and this repeated every 5 or 6 hours until all sensitiveness is relieved Good results have been obtained with this procedure[6] In young children Graham[7] injects from 25 to 40 cc of a 1 3 000 C P hydrochloric acid solution into the perirectal spaces with or without a local anesthetic This is sufficient to produce a perirectal bogginess, as noted by the palpating finger introduced into the rectum

Quinine Sulphuric Acid The injection of a sterile solution of quinine sulphate and dilute sulfuric acid (quinine sulf 12 grains acid sulf dil 30 minims and aqua distill 30 minims) is described[4, 0] for the purpose above mentioned

Technic *Gabriel* With the finger in the rectum as a guide, a 3½ inch needle is inserted into the perianal skin first on the right side about 1 inch from the anus The needle is introduced deeply into the perirectal tissue, and at this site three cc of the solution are injected The posterior and left sides are similarly treated

Phenol in Oil The submucous injection of 5 per cent phenol in oil has been advised in order to stimulate a fibrosis between the mucosa and muscular coats of the prolapse

Technic[0] Through a proctoscope, multiple punctures are made into the redundant mucosa about the entire circumference of the rectum The injection is begun at a point as high as possible and should end just above the anorectal line Two cc of the solution are injected at each site of puncture Three or four of such treatments will usually effect a cure

Quinine and Urea Hydrochloride In prolapse of the rectum the submucous injection of an aqueous solution of quinine and urea hydrochloride[1] has proved beneficial and is probably the most satisfactory for routine use In children, especially, the method is to be highly recommended

Technic *Terrell*[1, 4] Through a speculum and with the patient in the left lateral position, from 15 to 20 minims of a three per *cent quinine and urea hydrochloride* solution are injected beneath the mucous membrane in each quadrant of the prolapse Usually only one treatment is necessary but occasionally two or three may be required In no case, however, should the injection be made at or below *the anorectal line*

Comment This preparation of quinine is employed almost routinely for infants In a few hundred cases, only an occasional untoward reaction has been observed Our second choice is phenol in oil Sodium morrhuate may be used in *similar quantities*

Alcohol Successful results[29, 49, 5, 3, 10, 111] have been obtained by the injection of alcohol in various strengths and quantities beneath the mucosa or outside the rectal wall Apparently a sclerosis is *effected which* anchors the bowel at and around the point of injection[2, 46, 80]

Potter's Technic[17, 45, 110] Potter's technic for children is as follows With the patient

under an anesthetic, a long aspirating needle is inserted through the perianal skin about one inch lateral to the anal margin for a distance of from 2½ to 3 inches into the perirectal tissues Using the finger in the rectum as a guide *the top of the needle is* directed to a point just beneath the rectal mucous membrane where from 1 5 to 3 cc of alcohol are injected After the opposite side is similarly treated a sterile pad is applied and the buttocks are strapped together after which the child is placed on a Bradford frame for from 7 to 10 days In adults Lorin Epstein[80, 81] injects from 50 *to 60 cc of from 75 to 80 per cent* alcohol beneath the mucosa through the wall of the rectum from within outward and into the perirectal region

Phenol and Hamamelis The submucous injection of phenol and hamamelis has been advocated[88] for prolapse of the rectum At first one cc of the solution is placed beneath the mucous membrane and the dose gradually increased to 2 cc The injections are given once a week for a period of six weeks but one or two additional treatments are advisable after the bowel ceases to *protrude*

Operative Treatment

Since prolapse in children is usually amenable to measures as previously enumerated, especially the treatment by injection it is advisable in the beginning to attempt this form of therapy If, however no cure is effected, then one of the more *simple operative procedures* (internal rectorrhaphy) should be performed The same may be said of rectal prolapse when occurring in the adult even though surgical intervention is the method of choice For anal prolapse the treatment is always surgical Procidentia may be corrected by such procedures as are mentioned under rector

Operative Classification

Rectorrhaphy (Proctorrhaphy)	(a) Linear cauterization (Van Buren)	Internal approach
	(b) Clamp and cautery (Smith)	
	(c) Excision and suture (Duret)	
	(d) Excision and suture (Bacon)	
	(e) Mucosal avulsion and plication (Rehn Delorme David)	
	Shortening lateral ligaments (Lynch) { Vaginal / Abdominal }	Vaginal approach
	Longitudinal plication (Lange)	
Rectopexy (Proctopexy)	Transverse plication and suture (Verneuil)	Sacral approach
	Posterior proctorrhaphy (Gant)	
	Transverse plication and suture (Tuttle)	
	Tamponage (Lockhart Mummery)	
Colopexy (Sigmoidopexy)	Intersigmoidal fossa obliteration (Hirschman)	Abdominal approach
	Fixation to psoas muscle (Martin)	
	Cul de sac obliteration (Moschcowitz)	
	Cul de sac obliteration—modification (Graham)	
	Mobilization and fixation (Pemberton)	
	Fascial repair (Mayo)	
	Fascial repair (Orr)	
Resection	Bowel shortening by exteriorization (Bloch Mikulicz)	Abdominal approach
	Perineal anastomosis (Mikulicz)	Perineal approach
	Rectosigmoidectomy (Miles)	
	Perineal proctosigmoidectomy (Babcock)	
Amputation	Ligature (Reid)	

rhaphy, but in the author's experience the combined methods of obliteration and fixation from an abdominal approach achieve the best results. It should be borne in mind that no single method fulfills all the necessary requirements nor is any one ideal as a routine procedure. In each case the operation should be adapted to the individual rather than the individual to the operation.

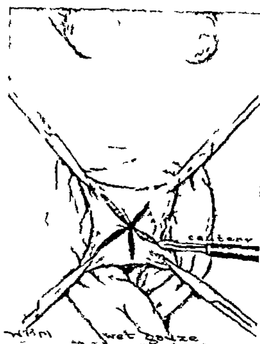


Fig. 361. Linear cauterization of van Buren. The margins of the prolapse are gently retracted and the mucosa seared in a longitudinal manner.

Rectorrhaphy. Linear Cauterization (Van Buren[1 8]). This method is indicated in cases of rectal prolapse and is especially ideal in children.[53] Its object is to produce adhesions between the mucosal and muscular layers of the rectum. The procedure consists of searing the redundant mucosa by four longitudinal lines in the circumference of the prolapse by means of the thermocautery and may be performed either with the prolapse outside the anus after which it is replaced, or within the rectal lumen through an operative speculum.

Technic. With the patient under an anesthetic and in the lithotomy position, the prolapse is drawn outside the anus and held taut with hemostats placed in four quadrants, as shown in Figure 361. The mucous membrane is dried, and with the Paquelin cautery at a dull heat, four longitudinal lines are burnt in the mucosa (Fig. 361) from the height of the prolapse to a point within ½ inch above the anorectal line.

Caution. The anterior midline is to be avoided, since this marks the lowest point of the peritoneal reflection. Ordinarily the depth of the searing should penetrate the mucosa down to the muscular coat. A rubber tube surrounded by petroleum jelly gauze is then inserted into the lumen of the prolapse and the entire protrusion returned into the rectum.

Postoperative Treatment. The patient should be confined to bed for several days, during which time mineral oil is administered by mouth and olive oil by rectum. At the end of the second or third day the tube and petroleum jelly gauze are withdrawn by a rotary motion in order to minimize direct tension on the mucosa. In all cases it is advisable to have the patient assume the recumbent posture during evacuation of the bowels.

Comment. The author has employed this technic in a large group of cases, but all were carefully selected. The results were usually satisfactory.

Clamp and Cautery Method (Smith[123]). The purpose of this procedure is to narrow the lumen of the lower rectum by the removal of portions of mucous membrane, and it is especially indicated in anal and low lying rectal prolapse. The method consists of removing V shaped strips of redundant mucous membrane in two, three or four areas on the circumference of the bowel by means of the clamp and cautery. The mucosa removed should extend from the anorectal line to the summit of the prolapse but eversion of the anal skin, if present may be included after incision of its free margin.

Technic. Under anesthesia, and with the patient in the lithotomy position the mu

cosa is drawn down by hemostats in the most dependent quadrants and a long bladed clamp applied in the long axis of the bowel as in hemorrhoidal operations (See p 489) Wet gauze is placed beneath binder tightly applied will serve to keep this in place

Comment The author s preceptor, the late Collier F Martin invariably used this method over a span of a decade or more

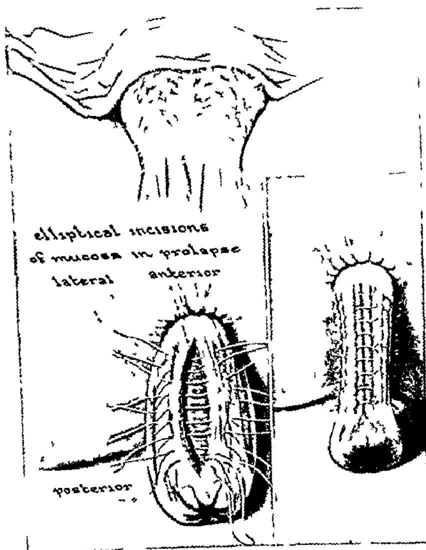


Fig 362 Operation of Duret Elliptical sections have been removed and the remaining edges united with interrupted sutures

the clamp after which the mucous membrane external to the clamp is excised with curved scissors and the Paquelin cautery applied at a dull red heat until a dark brown stump remains Each area is treated in a similar manner A rubber tube surrounded by petroleum jelly gauze is inserted at a high level into the rectum and retained for from two to four days A

and was well pleased with the results obtained It is our practice to employ it occasionally

Ligature Method or Excision of Mucosa Followed by Sutures (Duret[40]) The purpose and indications are similar to those described above Here elliptical portions of the redundant mucosa are excised longitudinally on the anterior and posterior

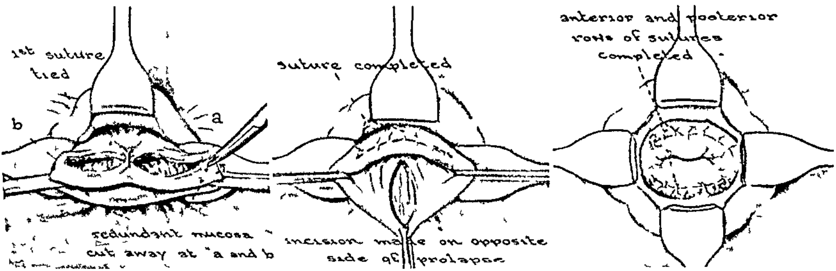


Fig 363 (*Left*) The anal margin is retracted and the prolapse held taut A longitudinal incision is made in the long axis of the bowel and the mucosa separated by blunt dissection Step 1 (*Right*) Diagram showing the site and the extent of the incisions

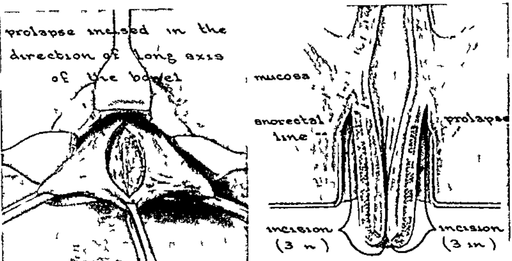


Fig 364 (*Left*) The lateral mucosal edges have been drawn apart to assume a transverse position Central fixation suture introduced (*Center*) The edges of the mucosa have been sutured The anterior half of the operation has been completed (*Right*) A similar procedure has been carried out on the posterior portion of the prolapse

surfaces of the prolapse The amount of mucous membrane removed will depend, however, on the size of the protrusion The presenting muscle coat on each surface is sutured transversely with chromic catgut sutures, so that when drawn taut and tied folds will be formed longitudinally (Fig 362) The free margins of the mucosa are then joined by a continuous suture of chromic catgut

Considerable enthusiasm has been accorded this method which is employed especially abroad It is the author's opinion that the method is *theoretically good* but practically unsound If adequate sections are excised replacement and proper unfolding are well nigh impossible in the writer's experience

Excision and Suture[1, 16] The procedure is applicable in prolapse involving the lower four inches of the rectum the purpose of which is to decrease the length yet increase the circumference which prevents subsequent stenosis The method consists of presenting the prolapse outside the anal aperture and making a longitudinal incision on each half through the mucosa after which having separated the latter from the underlying tissue the ends of the incisions are approximated and sutured together The excess tissue horizontally formed is crushed excised with scissors and both lips sutured with chromic catgut

Technic With the patient under an anesthetic and in the exaggerated lithotomy position the prolapse is drawn down with hemostats and held taut Opposite aspects of this protruding mass are selected as the anterior and posterior or right and left lateral A three inch longitudinal incision or one of sufficient length to give the desired shortening is made (Fig 363) beginning approximately one inch above the anorectal line in the half of the presenting bowel By blunt dissection the mucosa is separated from the underlying tissue below and after bleeding points are controlled the ends of the incision are approximated and sutured with catgut The everted mucosa thus formed horizontally is grasped with Allis forceps and crushed at its base with a curved clamp after which the tissue external to the clamp is excised with scissors or the cautery The free edges of the mucosa are retracted slightly in order to introduce a single row of chromic catgut sutures which pass from the underside of one reflected leaf, through the underlying tissue and to the underside of the opposite reflected leaf Interrupted sutures of chromic catgut are inserted to close the wound completely (Fig 364) The opposite half of the protruding bowel is treated in a longitudinal fashion after which a rubber tube five inches in length and surrounded by petroleum jelly gauze is introduced into the lumen of the protrusion The prolapse with tube in place is then gently pushed into the rectum and sterile pads applied to the anus which are supported by a T binder

The postoperative treatment consists of confining the patient to bed for four or five days during which time liberal quantities of liquid mineral oil are administered by mouth and warm olive oil is instilled through the tube into the rectum The latter together with the petroleum jelly gauze may be withdrawn at the end of the third or fourth day by a rotary movement rather than by direct removal

David's Modification of the Combined Rehn Delorme Operation[39, 140] Designed for rectal prolapse of large size especially where the sphincter muscles are atonic this method consists of denudation of the mucosa covering the prolapse and transverse plaiting by axial suture

Technic Under local analgesia a circular incision is made at the anorectal line (junction of anal skin and rectal mucosa) through the mucous membrane (Fig 365 [1]) By blunt dissection the mucosa is separated from the prolapsed segment as far as its apex and drawn downward (Fig 365 [2]) Bleeding points having been controlled catgut stitches are now inserted longitudinally in four sections of the pro

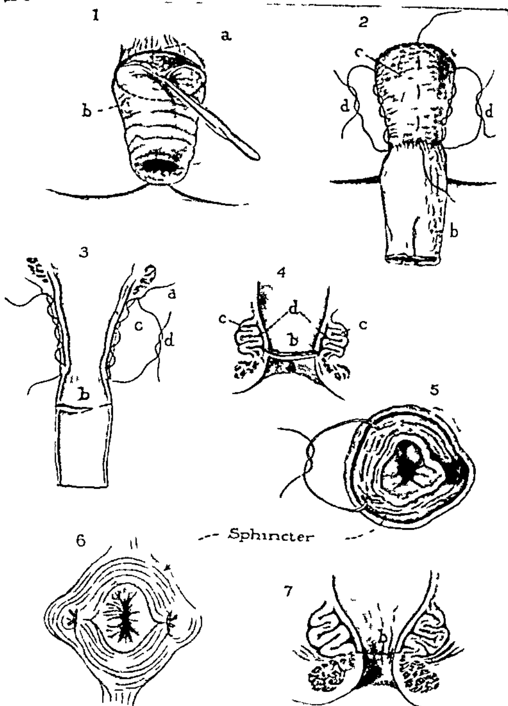


FIG 365 V Davids modification of Rehm Delorme operation (1) Circular incision at anorectal line from which point the mucosa is dissected loose from the muscularis of the bowel (2) Mucosa of prolapsed bowel hanging loose at (b), (d) sutures catching the muscularis of the prolapsed segment (3) Longitudinal section ' 2 showing flap of mucosa dissected free from prolapsed bowel hanging free below sutures at (d) catching the muscularis (c) of the outer prolapsed segment (b) lumen of prolapsed segment of bowel with intact bowel wall (4) Sutures (d) tied This reduces the prolapsing segment and puckers the muscularis (c) of the prolapsed segment into a bunch just inside the external sphincter muscle Enough of the prolapsed mucosa has been

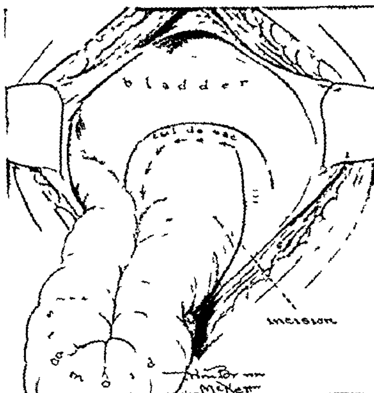


FIG 366 An incision is made just to the right of the bowel and carried between the bladder and the rectum as shown above The left lateral peritoneum is similarly incised

lapse beginning in the muscular coat at the anorectal line and ending at the apex (Fig 365 [3]) The sutures are tied which brings the apex of the prolapse toward the anorectal line The segment is then replaced (Fig 365 [4]) Inasmuch as the sphincter muscles are atrophic and atonic mattress sutures are inserted into one or more quadrants of the external sphincter in order to diminish its circumference (Fig 365 [5 6]) The excess of the denuded mucosa is excised and its free edges sutured without tension to the skin (Fig 365 [7])

Satisfactory results have been reported by Hayden[141] Dunphy[14] and others[39 69]

Combined Rectorrhaphy and Rectopexy RECTORRHAPHY Based on the original procedure published by Duval and Lenormant in 1904 Lynch[94 86] described a method to shorten the lateral ligaments which represent the chief supports of the rectum In the male the operation is performed through the abdomen while in the female the ligaments are approached through the vagina

Technic Male The abdomen is opened

removed so that the mucosa can be resutured to the skin at the anorectal line (a) without tension (5) Cross section of the rectum at the region of the external sphincter which is in the same plane with the incision made at the anorectal line showing catgut mattress sutures which tied lessen materially the circumference of the external sphincter muscle (6) Sutures tied showing narrowed anal opening by reason of decreased circumference of the external sphincter (7) Longitudinal section through the rectum showing completion of the operation with the muscularis of the previously prolapsed segment of bowel plicated and lying above the sphincter muscle with the cuff of mucosa sutured to the anal skin by interrupted catgut sutures (a and b) (Lewis Practice of Surgery Hagerstown Md Prior)

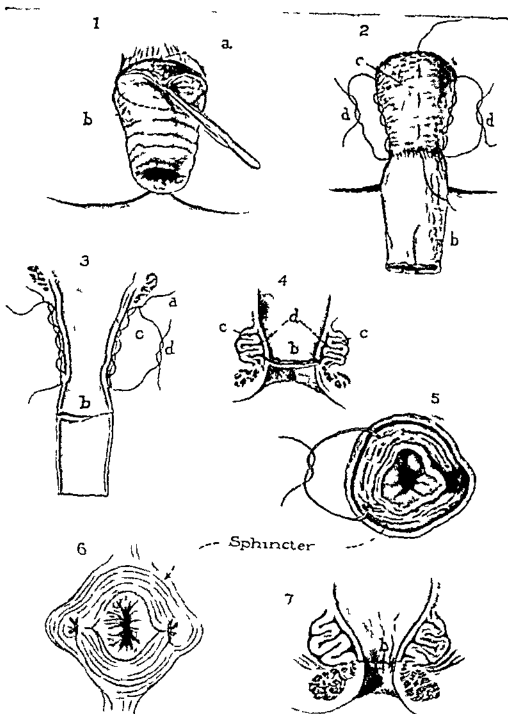


Fig 365 V Davids modification of Rehm Delorme operation (1) Circular incision at anorectal line from which point the mucosa is dissected loose from the muscularis of the bowel (2) Mucosa of prolapsed bowel hanging loose at (b) (d) sutures catching the muscularis of the prolapsed segment (3) Longitudinal section "2 showing flap of mucosa dissected free from prolapsed bowel hanging free below sutures at (d) catching the muscularis (c) of the outer prolapsed segment (b) lumen of prolapsed segment of bowel with intact bowel wall (4) Sutures (d) tied This reduces the prolapsing segment and puckers the muscularis (c) of the prolapsed segment into a bunch just inside the external sphincter muscle Enough of the prolapsed mucosa has been

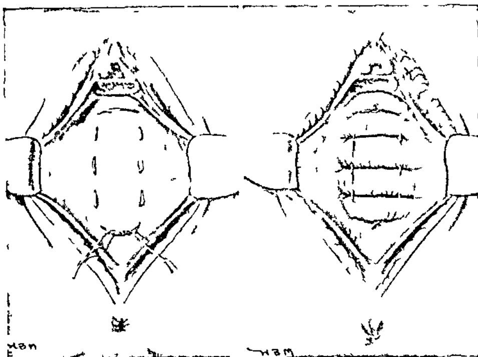


Fig 368 Lange (*Left*) The coccyx has been excised Longitudinal drawn string sutures have been introduced (*Right*) The longitudinal sutures have been drawn taut and tied Thus by the process of transverse infolding the posterior wall of the rectum is shortened

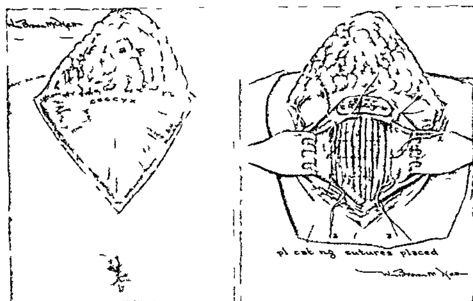


Fig 369 Verneuil operation (*Left*) A triangular flap is made with its apex toward but behind the anus (*Right*) Sutures introduced in a transverse manner

by a median incision, after which the patient is placed in the Trendelenburg position The leaves of the mesentery are cut close to the bowel and the incision is carried between the bladder and the rectum (Fig 366) The peritoneum of both leaves of the mesentery near the cul de sac is dissected back so as to expose the lateral ligaments, which are shortened on each side by interrupted sutures (Fig 367) A new diaphragm is then formed by suturing the peritoneum to the top of the pelvic colon

Female An incision through the posterior vaginal wall is made from the cervix to the transversus perinei muscle and the vaginal wall dissected from the rectum to expose the lateral ligaments The latter are then shortened on each side by means of interrupted chromic catgut sutures More recently, Lynch and Hamilton[84] as well as Hayes[143] found that improved results may

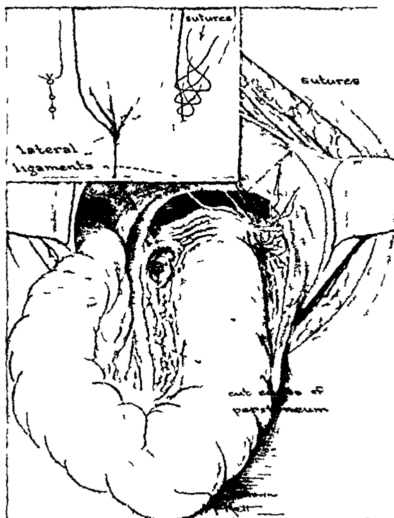


Fig 367 The peritoneum has been dissected back and the lateral ligaments exposed on either side Interrupted cat gut sutures are then introduced

be obtained by reconstructing the pelvic floor on a higher plane in such a manner that it (pelvic floor) slopes from behind forward and from above downward toward the symphysis pubis

Longitudinal Plication (Lange[7]) This procedure consists of narrowing the rectal lumen by plicating and plaiting the posterior and posterolateral aspects of the rectum

Technic An incision is made in the pos

its mesorectal attachments above, and from its attachments to the lateral ligaments on each side The procidentia is then replaced by an assistant and inverted through the incision by means of the latter s finger inserted into the lumen of the bowel A series gauze to prevent cutting through the skin The patient is confined to bed for two or three weeks On the seventh or eighth day the bowels are moved by enemas The anchor sutures are withdrawn between the tenth and fourteenth day

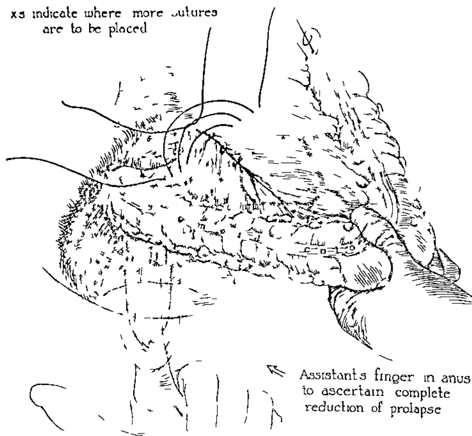


Fig 371 Hirschman s operation (*Left*) Showing the introduction of three rows of catgut sutures to obliterate the intersigmoidal fossa (*Right*) The catgut sutures have been tied This elevates the protruding bowel

of silkworm gut sutures are passed transversely through the muscular coat embracing as much of the circumference of the rectum as possible The free ends of each suture beginning with the uppermost are threaded on a Peasley needle and carried up through the wound to the highest point of separation between the rectum and sacrum where they are brought through the soft tissues on each side of the bowel These sutures are then drawn taut to lift the rectum upward and each is tied to its fellow on the opposite side over a pad of

Method of Tamponage in Retrorectal Space (Lockhart Mummery s Operation) [78] The rationale of this procedure is to fix the rectum to the hollow of the sacrum by fibrous tissue produced by the healing of a large granulating wound in the retrorectal space

Technic A transverse incision is made two inches in length midway between the anus and the tip of the coccyx The retrorectal space is opened by careful dissection, and the fingers are introduced to separate the rectum from the sacrum and coccyx

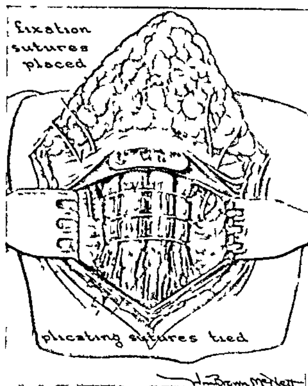


Fig 370 By tying the sutures the rectum is thrown into a series of longitudinal folds Fixation sutures introduced

terior midline from the lower part of the sacrum to a point within one inch of the anal orifice The coccyx is removed, and the rectum exposed by dissecting back its posterior and lateral attachments A series of catgut sutures is then placed longitudinally through the muscular coat of the rectum in such a way that when drawn taut and tied, the wall will fold inward in a horizontal direction (Fig 368) Repair of muscular and fascial structures and closure of the wound complete the operation

Transverse Plication (Verneuil[179 130]) This is a combination of shortening and fixation of the rectum The method resembles that of Lange except that a triangular skin flap is formed with its base upward horizontally over the coccyx, and its apex toward the anus (Fig 369) After exposing the rectum, transverse sutures of chromic catgut are introduced through the muscular coat of the posterior rectal wall (Fig 369) so that when drawn taut and tied, longitudinal folds are formed which diminish its length (Fig 370) Fixation is accomplished by suturing the rectum to the sacrococcygeal structures by buried sutures

Posterior Proctorrhaphy (Gant's Operation) [4] As described by this author, the procedure embodies shortening of the posterior wall of the rectum by suturing a longitudinal incision transversely, and fixation by suturing the bowel to the tissues in the region of the sacrum

Technic A curved incision is made transversely midway between the anus and coccyx, after which the rectum is exposed by severing its posterior and lateral attachments An assistant's finger is inserted through the anal canal and the posterior rectal wall pressed backward into the incision The bowel is grasped with hemostats and drawn through the wound, after which a longitudinal incision, of sufficient length to shorten the gut, is made through the entire thickness of the bowel Traction sutures are introduced laterally, and after drawing these apart the edges are sutured together transversely with chromic catgut The free ends of the traction sutures on each side are threaded on a curved needle and carried upward as high as possible, to be introduced through all the tissues near the sacral borders The bowel is then replaced and the wound closed by interrupted sutures after insertion of a drain

Transverse Plication (Tuttle) [48 177] This method consists of exposing the rectum through a posterior curved incision and placing sutures transversely through the muscular coat of the bowel, after which the free ends are carried up to and through the tissues on each side of the sacrum and tied thus fixing the rectum

Technic With the patient in the left lateral position the hips elevated and the thighs flexed on the abdomen the procidentia is drawn outside the anal orifice and held taut by an assistant A slightly curved transverse incision is then made midway between the anus and coccyx, and the levator muscle divided longitudinally

By introducing two or three fingers through the wound the rectum is separated from the coccyx and sacrum behind from

Technic The abdomen is opened through a left rectus incision and the pelvic colon exposed after which the patient is placed in the Trendelenburg position The sigmoid colon is drawn upward and the anterior surface of the intersigmoidal fossa exposed Following reduction of the telescoped rectosigmoid as noted by the assistant s finger introduced into the rectum the intersigmoidal fossa is obliterated by means of three or more rows of catgut sutures extending from one side of the peritoneal coat of the mesentery to the other (Fig 371) By tying the lowermost sutures the protruding bowel is elevated and the serous surfaces are approximated (Fig 371) after which the attachment is made at the root of the mesentery The sutures should be passed parallel to and between the blood vessels and only through the peritoneum of the mesosigmoid

FIXATION TO PSOAS MUSCLE Based on the original work of Jeannel[60] the modifications of Pachino[107] and those later by Quenu and Duval[116] Martin[97] has devised a procedure in which the bowel is fixed by suture to the tendinous portion of the psoas minor muscle

Technic A left rectus incision is made from the pubes to the umbilicus The colon is exposed and drawn taut which reduces the procidentia (Fig 372) The tendinous portion of the psoas minor muscle (lying in front of the psoas major) or the iliacus fascia is selected for the fixation A three inch incision is made in the retroperitoneum outside the left ureter after which a single silk suture is passed through the longitudinal band of the colon and the psoas minor and left untied Four similar sutures are placed a short distance apart so that when the first is drawn taut and tied the colon will approximate the exposed fascia (Fig 372A) The successive sutures are then tied The exposed fascial areas are covered lightly by suturing the outer edge of the incised peritoneum to the colon (Fig 372B) The abdomen is closed in the usual manner

Comment During the past several years



FIG 373 Procidentia of the anterior rectal wall

the Martin technic has served as a part of 24 intra abdominal procedures which we have performed for the correction of procidentia While our surgical maneuver has included obliteration of the peritoneal pouch plication and invariably uterine suspension in the female together with the above method of fixation the author has knowledge of only three recurrences There were no deaths (see Table 39)

Pertinent to sigmoidopexy in general Pachino[107] reported a series of 58 cases with one death and 13 recurrences Hartmann[67] cites a group of 22 cases without a single death but with 12 recurrences Carrasco[3] describes six cases without recurrence

OBLITERATION OF THE CUL DE SAC OF DOUGLAS Based on the general accepted theory[3, 170] that rectal procidentia is analogous to a hernia of the sliding type which owing to relaxation of the pelvic fascia brought about by some anomaly anatomic weakness or constant increase in intra abdominal pressure permits the small intestine to descend against the anterior rectal wall Samter[170] Quenu and Duval[116]

Iodoform gauze is lightly inserted into the wound and the latter permitted to remain open An enema is administered on the seventh day and each day thereafter Toward the end of the third week the gauze is removed, but the patient is confined to bed for from four to six weeks from date of operation

Comment Some of the author s confreres have employed this method to their satisfaction The writer's experience has been limited to one case, which, while symptom free for a period of more than one year, necessitated a more radical maneuver because of recurrence

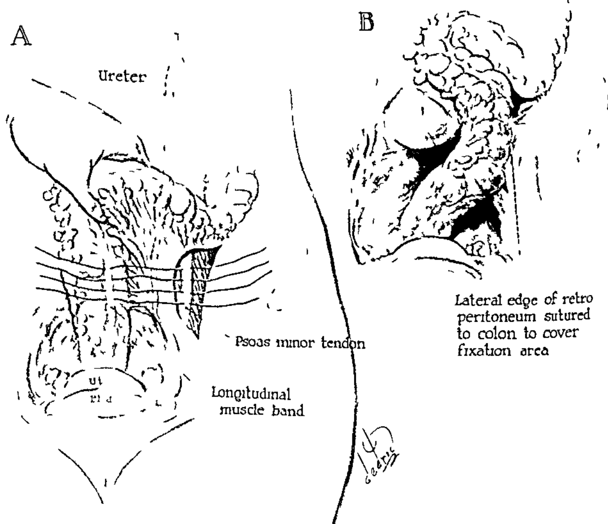


FIG 372 E G Martin s operation (*Left*) Pelvic colon pulled up taut (prolapse reduced in situ) Diagrammatic Incision through the retroperitoneum, exposing the tendinous portion of the psoas minor muscle (*Right*) A, Chromic gut sutures placed for fixation B, Lateral peritoneal edge of wound sutured to colon, covering the exposed fixation area

Colopexy INTERSIGMOIDAL FOSSA OBLITERATION (HIRSCHMAN) As described by this author,[64 &] the method consists of obliterating the intersigmoidal fossa by shortening the elongated mesosigmoid without excision of tissue or interference with circulation

and Moschcowitz[100] developed a procedure that has proved of definite value (Fig 373)

Technic A median abdominal incision is made from the umbilicus to the symphysis pubis and the patient placed in the extreme Trendelenburg position In the female the sigmoid colon is drawn upward and silk or catgut sutures are passed circularly around the cul de sac of Douglas The lowest suture should be about one inch above the apex of the pouch and those succeeding, from about six to eight in number, are introduced one above the other so as to bring the peritoneum together thereby obliterating the cul de sac (Fig 374) The pelvic fascia especially over the levator ani muscles should be included in these sutures as well as the supravaginal portion of the cervix and the body of the uterus Care should be taken to avoid the ureters, also the uterine and iliac vessels

GRAHAM'S MODIFICATION Graham[8, 9] concurs with the views of Jeannel[99] and Moschcowitz[100] as to etiology but believes that adequate repair can be accomplished only by employing the same principles applied to all hernias, especially to sliding hernia

In order to remove the peritoneal sac and restore the anatomic defect in the pelvic fascia Graham advocates the following procedure

Technic With the patient in the Trendelenburg position the abdomen is opened through a long left rectus incision The peritoneum of the rectovesical or recto-uterine (Douglas) pouch is opened and dissected free from the extraperitoneal fat

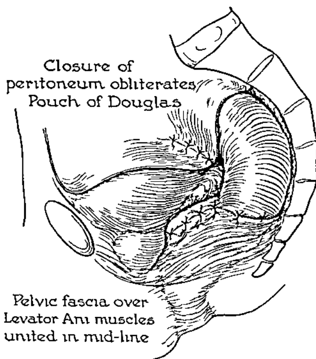


FIG 375 B The levator ani muscles are approximated and their fascial covering united to the rectum by interrupted silk sutures This may be reinforced by sutures of fascia lata This approximation of the levators replaces the rectum in its normal relation to the hollow of the sacrum and prevents its prolapse The redundant peritoneum of the pouch of Douglas is excised and on closing the posterior parietal peritoneum the pouch of Douglas is obliterated (R Graham Ann Surg 115 1010)

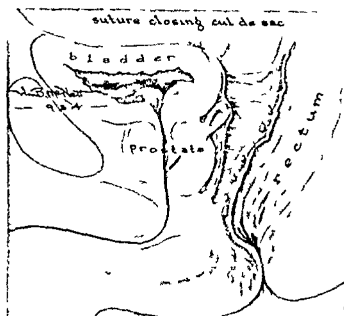


Fig 374 Moschocowitz Obliteration of the rectovesical pouch

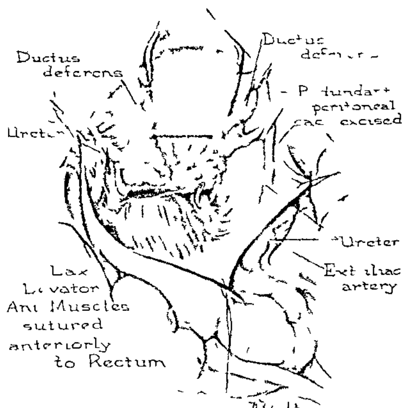
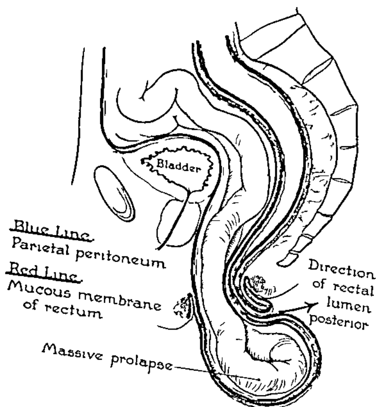
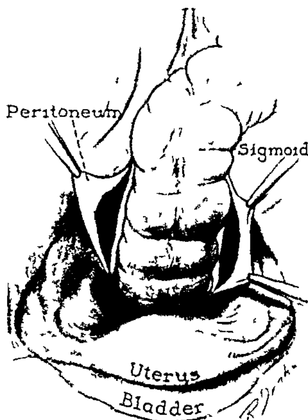


Fig 375 A The dissection completed identifies the ureters the seminal vesicles and the separated levator ani muscles identified by the sutures They with the overlying fascia are approximated with locked mattress sutures of silk This closure in one case was *reinforced by a strip of fascia lata* suture (R Graham Ann Surg 115 1000)



The invagination of the anterior rectal wall into itself and through the anal canal separates the fascial and muscular supports of the rectum and by overstretching results in incompetence of the anal sphincter The lengthening of the mesentery of the small bowel occurs over the years to such a degree that small bowel lies within the hernial sac of a massive prolapse (R R Graham Ann Surg **115** 1009)



and areolar tissue The ureters are identified and surrounded with tape in order to retract them laterally Further dissection of the perirectal fat visualizes the seminal vesicles and the widely separated fascial covered borders of the levator ani muscles The rectum is pulled taut and interrupted mattress sutures of silk are placed in the fascia covering the levator muscles The resultant approximation of the levators forces the rectum into the hollow of the sacrum

To restore the normal angulation of the rectum, the repair may be re enforced by fascia lata The redundant hernial sac is excised and the pelvic peritoneum sutured to obliterate the rectovesical or recto uterine pouch The abdomen is then closed without drainage

Comment Graham reports that the procedure was successfully performed on these patients and found the return of sphincter tone remarkable

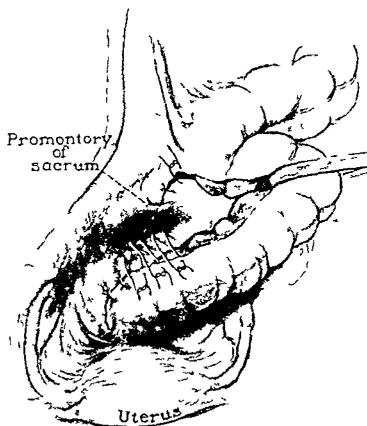
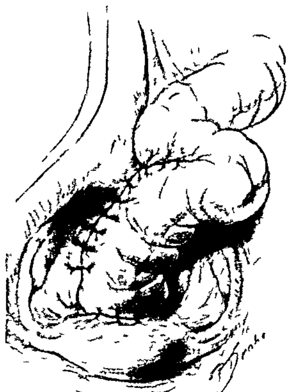


Fig 376 A (*Top*) Incision of the lateral parietal peritoneum (*Bottom*) The prolapsed bowel elevated and reflected flaps of peritoneum approximated The raw surfaces of the bowel are peritonized and the elevated bowel fixed in its elevated position (Pemberton and Stalker Ann Surg 109 802)

MOBILIZATION AND FIXATION To facilitate exteriorization of the rectosigmoid Pemberton[103] divides the pelvic peritoneum at its point of reflection and frees the rectum from the hollow of the sacrum to the coccyx tip It was observed that where the bowel was pulled taut and anchored, the cavity between the rectum and sacrum subsequently filled in with a ridge of scar tissue which produced firm fixation to the distal portion of the bowel (Fig 376 A)

Technic Through a left paramedian incision the sigmoid is pulled taut and an incision made in the peritoneum on both sides of the mesentery of the bowel and carried forward toward the bladder The ureters are identified

The bowel is lifted and, with a hand behind it in the hollow of the sacrum, the rectum is freed by blunt dissection The hand is carried downward and forward until the dissecting fingers are felt at the tip of the coccyx With the rectum held taut the



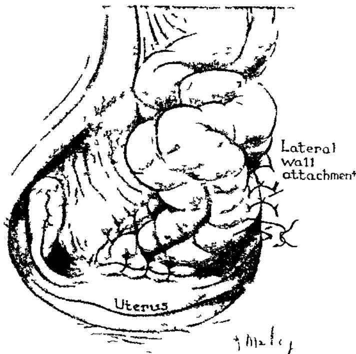


FIG 376 B (*Top*) Fixation of the elevated bowel by attaching it to itself to the uterus and to the walls of the pelvis (*Bottom*) Fixation of sigmoid to lateral abdominal wall (Pemberton and Stalker Ann Surg 109 802)

reflected flaps of peritoneum are closed over this potential cavity and the raw surfaces of the bowel peritonized The bowel is fixed in its elevated position by suturing it to various portions of the abdominal wall, to the pelvic organs to the peritoneum of the lateral walls or to the brim of the pelvis

Comment Pemberton performed the procedure in six cases with excellent results

FASCIAL REPAIR For the treatment of advanced rectal prolapse which is accompanied by perineal herniation of the small bowel C W Mayo[9] advocates a fascial repair procedure based on the hypothesis that prolapse of the rectum is the result of congenital insufficiency aided and abetted by individual characteristics of habit or occupation or by accident Failure to recognize the fact that in most instances rectal prolapse is or at least is accompanied by median perineal hernia is according to this author the principal cause for failure in a high percentage of attempts at extraperitoneal repair This method has been performed successfully by its originator without undue trauma or risk (Fig 376 B and C)

Technic The abdomen is opened by an adequate midline incision and the ureters and internal iliac vessels are identified Strips of fascia lata obtained according to the Masson technic are employed to construct the frame, or bridgework of a new pelvic floor (Fig 377 A I VI) The frame runs transversely and obliquely across the pelvis above anteriorly and laterally to the region of the internal iliac vessels and ureters The anteroposterior strip of fascia runs from the promontory of the sacrum to the midportion of the anterior transverse fascial strip

The median perineal hernia is obliterated by imbrication on the fascial framework and peritonization of the fascia Elevation of the hernial sac in turn elevates and

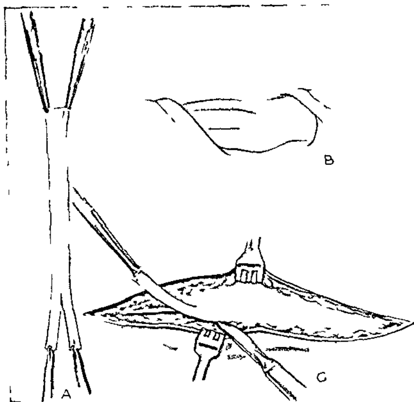


FIG 377 B Technic of removal of fascial strips from fascia lata (T Orr Ann Surg 126 835)

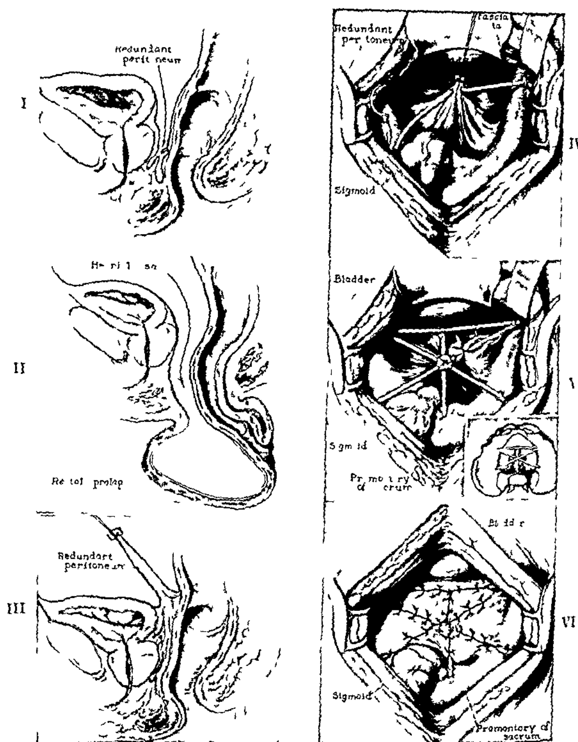


Fig 377 A Mayo (I) Beginning of perineal hernia (II) Perineal hernia and rectal prolapse fully developed (III) First step in repair Elevation of the redundant peritoneum (IV) Second step in repair Insertion of a strip of fascia through the apex of the elevated redundant peritoneum and fixation of the ends of the strip to lateral structures at the pelvic brim (V) Later steps in repair Other strips of fascia lata in place to form a framework and beginning of imbrication of peritoneum over one of the strips (VI) Repair complete Peritoneum imbricated over all strips of fascia lata forming a new pelvic floor

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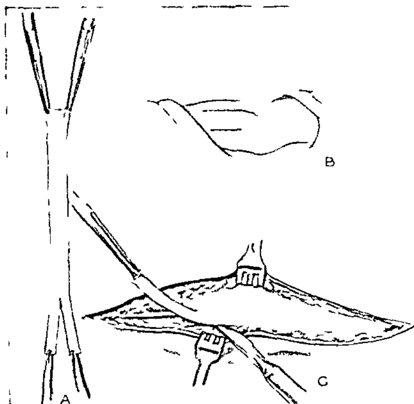


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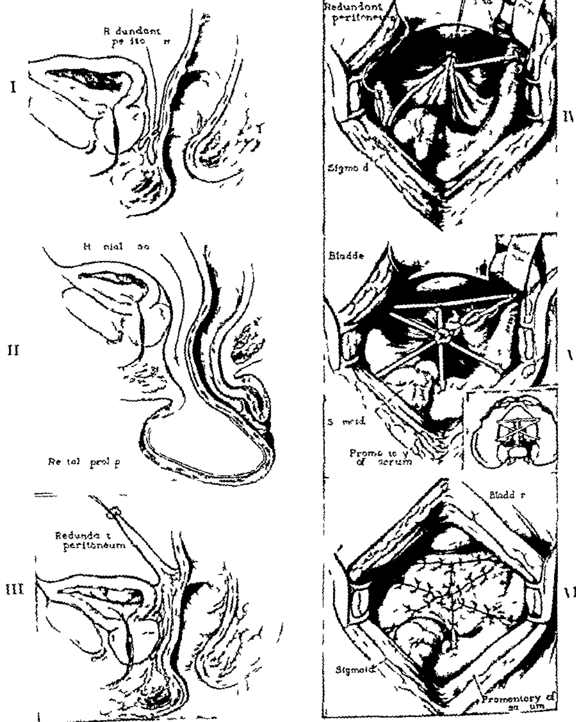


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of the fascial strips to the fascia, a distance of at least 2 cm The cul de sac is obliterated by two or more rows of interrupted silk sutures placed across the pelvis The peritoneum *is sutured to the anterior wall of* the rectum as each row of sutures is placed Finally a fold of peritoneum is sutured to the rectum on each side to cover the fascial strips The abdominal and thigh wounds are closed Orr employed this technic in four instances The results achieved were satisfactory no evidence of recurrence, function normal (Fig 377 B and C)

Ghedini s Operation is a combination of rectopexy rectoplication obliteration of the peritoneal pouch and perineo anorrhaphy (restoration of the pelvic floor)

Bowel Shortening and Fixation Exteriorization and Anastomosis The exteriorization method recommended by Bloch [1] and Mikulicz[97] may be well employed in selected cases of massive procidentia provided the sigmoid is particularly redundant and elongated As described elsewhere (p 806 Chap 19 Malignancy) the abdomen is opened and the pelvic colon drawn taut After dividing the mesosigmoid between clamps the redundant bowel is exteriorized and the proximal and distal limbs are united with interrupted catgut sutures placed in the longitudinal band The abdominal wall is then closed around the exteriorized bowel The latter is excised and after all edema has subsided a spur clamp is applied The final step consists of closure of the colonic openings For the purpose outlined the extraperitoneal technic of closure must be employed so that the lower or distal segment *is fixed to the abdominal wall (p 809)*

Ault [10] Brashear [4] and the writer have employed this method with satisfaction

Resection Mikulicz s Operation [9, 98] In this procedure the protruding rectum is excised after which the continuity of the bowel is restored by suturing the remaining segments together The method may be considered to be indicated where reduction is impossible due to hypertrophy and adhesions in the presence of sloughing and gangrene of the protruding bowel [101]



Fig 377 D W T age 81 Procidentia corrected by abdominal Mikulicz procedure

Technic With the patient in the exaggerated lithotomy position the procidentia is grasped with hemostats and drawn outside the anus as far as possible After the protrusion is cleansed and the distal end snugly surrounded with a sterile towel a circular incision *is made on the anterior* surface of the procidentia approximately one inch from the anal margin The incision is carried carefully through each bowel coat until the peritoneal layer is presented Hemostasis is controlled by fine catgut *The peritoneal pouch* is opened which exposes the anterior or serous layer of the inner segment The serosa of the inner segment is then united to the serosa of the outer segment by means of interrupted Lembert sutures which completely obliterate the peritoneal pouch (Fig 378) The remaining layers of the inner segment are now severed transversely and the edges of both anterior walls (including all the layers of each segment) united by a continuous suture of chromic catgut The posterior

shortens the lateral ligaments of the rectum The elevated points are fixed on the fascial framework, and thus the retrovesical region is obliterated by shortening the peritoneal fold The point of exit of the sigmoid, lata The abdomen is opened through a paramedian incision, and with the pelvis emptied of its contents, a tape is passed through the mesosigmoid for traction The fascia above the promontory of the sacrum

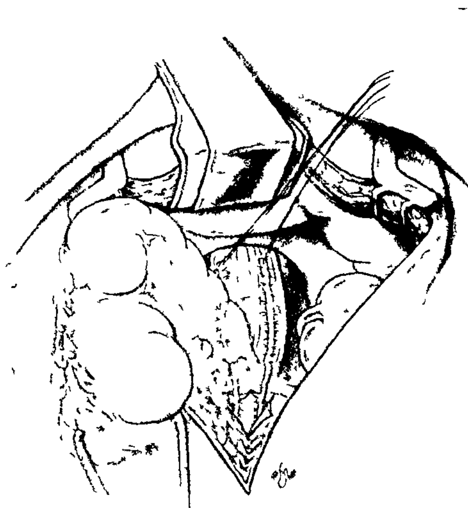


FIG 377 C Fascial strips sutured to rectal wall and to fascia above the promontory of the sacrum On the left the fascial strip is passed through the mesentery of the sigmoid (T Orr Ann Surg 126 834)

to the left of the sacrum, is strengthened by obliterating the space and fixing the sigmoid at that point by employment of epiploic tags When the uterus is present, ventral fixation should be performed

Another procedure recently described by Orr[144] is designed to correct an abnormally attached rectosigmoid with a long mesentery and a deep cul de sac Two strips of fascia from 1 to 2 cm wide and from 10 to 12 cm long are excised from the fascia is exposed through an inverted T shaped incision in the peritoneum A strip of fascia is sutured to each side of the rectum with a double row of fine silk interruptedly placed The strip of fascia on the left is passed through a puncture wound made in the mesosigmoid While the rectum is held taut, the proximal or upper ends of the fascial strips are sutured to the dense fascia above the sacral promontory Interrupted silk sutures are used to attach both margins

outer and inner segments of the procidentia are then treated in a similar manner (Fig 378) A soft rubber tube surrounded by petroleum jelly gauze is then inserted high up into the bowel and the gut replaced to its natural position

Comment Our experience with this operation was limited to four cases Two died of peritonitis Because of the necessity of suturing the various coats individually, the time consumed in its performance and the rate of mortality other methods of approach appear more desirable

RECTOSIGMOIDECTOMY Originally performed by Auffret[9] and employed by others early in the twentieth century[37 1 1 19] Miles[100 101] described an amputative type of operation under the title 'rectosigmoidectomy The procedure which is performed by the perineal approach consists of mobilization of the rectum and lower sigmoid establishing a peritoneal floor amputation of the protruding bowel and suture of the sigmoid to the anal margin The sphincter muscles are preserved

Technic The apex of the procidentia is grasped and protruded to its full extent Commencing anteriorly one half inch from Hilton's white line, a longitudinal incision two and one half inches long is made through the mucosa on the anterior surface of the protrusion and then by blunt dissection, the mucosa is separated from the underlying muscular coat as far laterally as possible on each side The mucosa is similarly dealt with on the posterior aspect At the level of the upper extremity of the incision the mucosa is divided transversely on each side as far as the lateral borders of the protruded bowel thus exposing the muscular coat of the rectum The posterior aspect is treated in a similar fashion so that the muscular coat of the rectum is denuded of mucosa throughout its entire circumference To prevent damage to the external sphincter muscle and especially to the point of fusion between the levator ani and the external muscular coat of the rectum, upon which depends subsequent control of evacuations the muscular coat is incised longitudinally on its anterior surface by an incision corresponding in length to the initial incision through the mucosa The peritoneal pouch is opened exposing the pelvic colon and the vascular pedicle on the posterior wall ligated between clamps

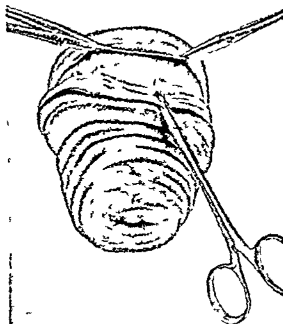
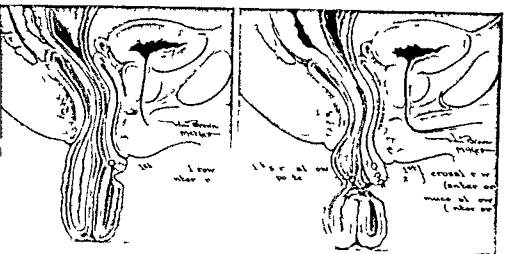


FIG 379 A Amputation of complete prolapse of the rectum Circular incision through the outer layer of the prolapse (Gabriel London Lewis)

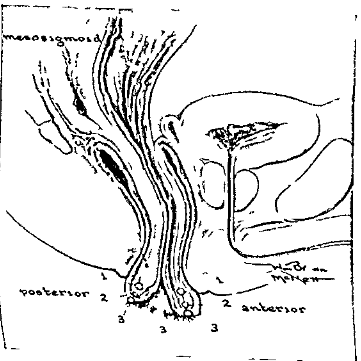
In this manner the bowel is drawn well into the pelvic wound The muscular coat of the rectum is divided transversely throughout its circumference at the level of the upper angle of the longitudinal incision The closure of the peritoneal pouch is established between the cut edge of the peritoneum and the anterior and lateral surfaces of the pelvic colon The sigmoid is

Fig 378 Mikulicz's operation

First Step Sagittal section showing incision through the mucosa, submucosa, muscular layer and serosa The serosa of the inner segment and that of the outer segment have been united

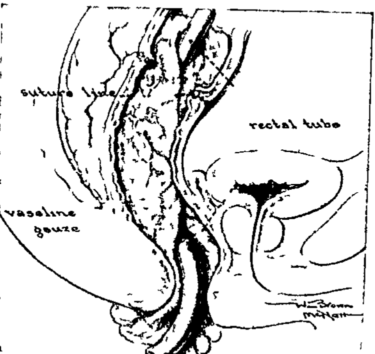


Second Step Having united and reinforced the serosal layers, the incision is carried completely through the inner segment of the lumen of the bowel The mucosal, submucosal and muscular layers are not sutured The posterior portion of the procidentia is now treated in a similar manner It will be noted that the incision has been carried through the anterior half of the posterior segment and a serosal row of sutures introduced



Third Step Showing the appearance following removal of the distal bowel Numbers 1 and 2 represent the first and second serosal layer of sutures, respectively and Number 3, the mucosal

Fourth Step A rubber tube surrounded by petrolatum jelly gauze has been introduced into the lumen of the bowel and the bowel replaced to its natural position



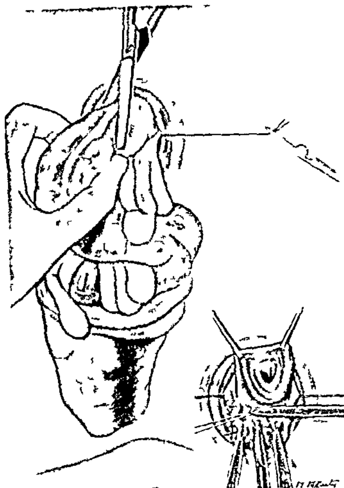


FIG 379 C Division of pelvic colon with scissors about 1 inch distal to the anus Inset shows ligation of vessels in the pelvic mesocolon (Gabriel London, Lewis)

PERINEAL PROCTOSIGMOIDECTOMY This procedure is based on the technic designed by Babcock[11] and others[7] [7] for lower bowel malignancy As modified [13] [14] the sphincter muscles are preserved in their entirety without incision in any quadrant which insures normal sphincter contraction following operation The rectum and sigmoid are mobilized entirely by the perineal approach and the bowel is drawn through the wound An anterolateral pelvic floor is established and the sphincter musculature permitted to assume its natural position The redundant bowel is then excised but no sutures are introduced for fixation

Technic With the patient under lumbar analgesia and in the exaggerated lithotomy position the rectum is packed with antisepticized gauze Four Pennington clamps are placed at the anal margins in divergent quadrants and a circumferential incision is carried through the anal skin ⅛ inch distal to the anorectal line The sphincter muscles are dissected and retracted laterally At this point flat clamps preferably of the Pennington type are placed in a longitudinal direction to the edges of the bowel thereby closing the lumen Separation from the anterior structures is now begun Cautiously the line of cleavage between the rectum and prostate is followed until the base of the bladder and the seminal vesicles, with the vas deferens come into view In the female the rectovaginal septum is separated

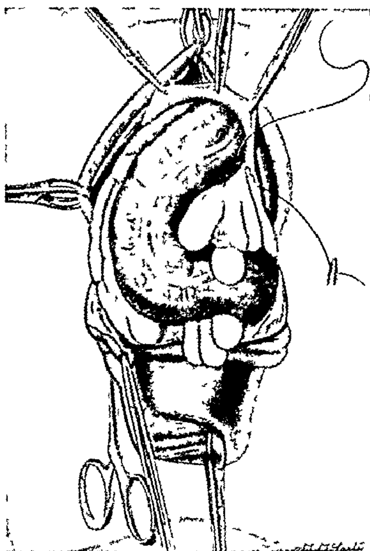


Fig 379 B Shows method of closing peritoneum after delivery of loose pelvic colon (Gabriel London Lewis)

completely divided at a point at least one half inch above the level of the ligature upon the pelvic mesocolon Finally the edge of the pelvic colon is stitched to the stump of the rectum by means of interrupted sutures of catgut first muscular to muscular and then mucosa to mucosa

Postoperative Care Evacuations are retarded for five days, after which an olive oil enema is administered The index finger is introduced at the expiration of ten days and daily thereafter The results obtained by this technic are appended in the following table

Table 38 Rectosigmoidectomy (Miles)

Author	Bibliography	No Cases	No Deaths	Recurrences
Miles	99	31	1	1
Gabriel	51	40	2	6 (23 cases followed)
Abel	1	3	1	?
Sheldon	121	5	0	0
Yeomans	138	3	1	0

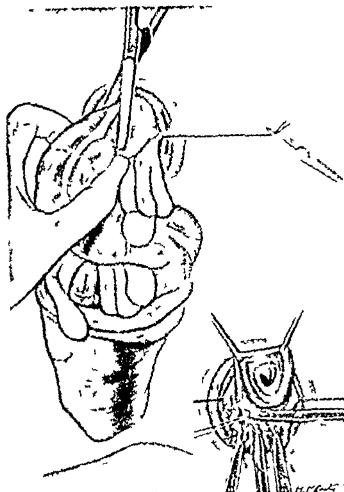


FIG 379 C Division of pelvic colon with scissors about 1 inch distal to the anus Inset shows ligation of vessels in the pelvic mesocolon (Gabriel London, Lewis)

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by blunt dissection By making traction on the bowel, the levator muscles are easily discernible These are clamped, divided and ligated Posteriorly, a transverse incision is made through the fascia propria, after which the rectum is readily stripped from the anterior surface of the sacrum by blunt and finger dissection The peritoneum is opened anteriorly and the lateral ligaments divided and ligated Mobilization of the rectum and lower sigmoid having been completed the bowel is delivered by traction through the retracted sphincters An anterolateral floor is established and a curved perforated metal tube placed along the sacrum Dressings are applied around the bowel, which is divided at a distance of 7 cm beyond the anal margin A mushroom catheter is introduced into the bowel lumen and tied in place for three days

Postoperative Care The regimen following operation is not unlike that described under preoperative and postoperative treatment (see p 746) The presacral drain is removed at the expiration of 24 hours Warm physiologic saline solution is gently instilled into the bowel through the mushroom catheter at least twice daily This tube is removed after the first bowel movement Following proctosigmoidectomy by the perineal route patients are usually permitted out of bed on their third postoperative day The redundant bowel is excised on the eighth day and the mucosal edges



Fig 380 A S Procidentia

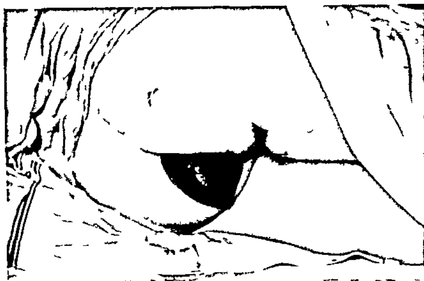


Fig 381A M S Procidentia of sigmoid corrected by intra abdominal procedure

sutured to the cephalic edges of the anal skin An example of perineal proctosigmoidectomy performed for an extensive procidentia is described briefly herewith

Mrs S P (T U H 84174) a white female age 54 complained of protrusion for a period of three years The patient stated that the bowel protruded when standing and following evacuation Examination disclosed a protruding mass of bowel approximately 7 inches in length presenting striations circumferentially arranged The process appeared to involve all coats of the bowel and the mucosa was severely eroded Following replacement the sphincter musculature was definitely hypotonic The patient was prepared for operation and on May 28, 1942 a perineal proctosigmoidectomy was performed without colostomy and with preservation of the sphincter musculature The postoperative course was uneventful and the patient was discharged on her twentieth day During 1943 because of a uterine prolapse a ventral suspension was instituted The patient has been followed periodically since that time and has been symptom free

Amputation Constriction by Elastic Ligature Kleberg[0] several decades ago described a procedure which was successfully employed by many[17, 19, 23, 68, 13] More recently this technic has been revived by Reid[119]

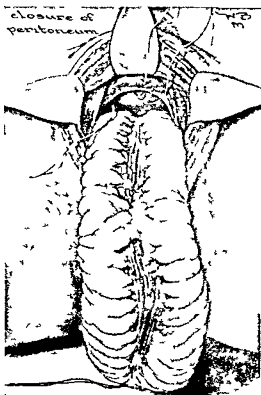
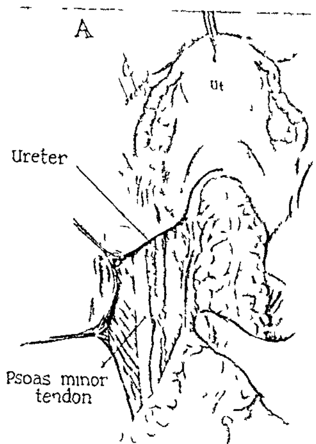


Fig 381B Mobilization completed anterolateral floor or pelvic diaphragm established by suture (H E Bacon Am J Surg 71 728



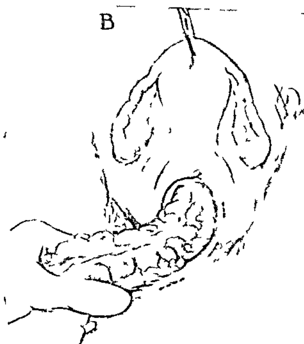
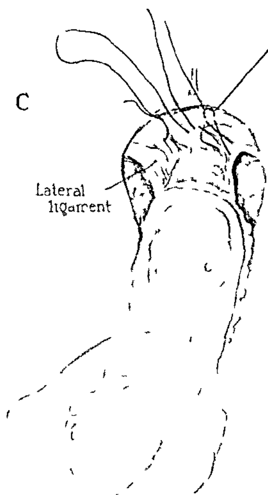
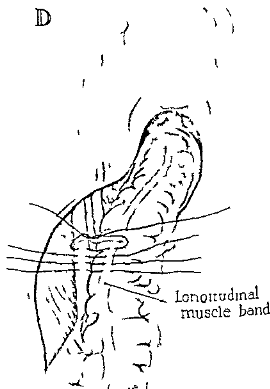
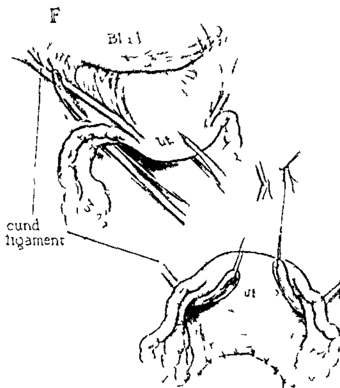


Fig 382 (A) Incision in left lateral gutter exposing tendon of psoas minor (B) Uterus elevated, bowel drawn taut and incision carried in right later leaf to meet fellow of opposite side (C) Recto sigmoid and rectum mobilized anteriorly and posteriorly thus rendering prominent the lateral ligaments The lateral ligament on the right has been sutured to Denonvillier's aponeurosis in the

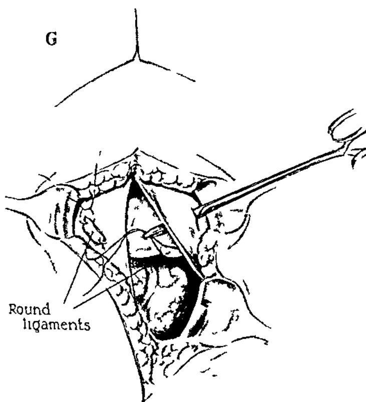








female endopelvic fascia in the male using figure of eight stitch On the left, suture is being introduced In this way plication is achieved (D) Bowel is held taut while, interrupted sutures are introduced between longitudinal band and tendon of psoas minor (E) Incised peritoneum is sutured with fine catgut (F) Steps in uterine suspension Round ligament on each side is drawn through slit in broad ligament and elevated Cul de sac is obliterated by the introduction of a series of fine silk sutures interruptedly placed (G) Fixation of round ligament to anterior abdominal wall The skin and the fat have been retracted to expose the aponeurosis A stab wound is made through the aponeurosis the muscle and the peritoneum on each side On right temporary ligature about round ligament is grasped by hemostat On left round ligament has been drawn through stab wound and sutured for one half its thickness with alloy steel wire Finally abdomen is closed using figure of eight alloy steel wire



Techni The procidentia is carefully examined as it protrudes through the anus in an effort to be assured that no intestine has herniated into the peritoneal pouch Rubber

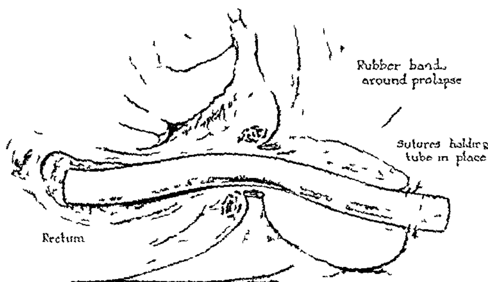


FIG 383 Treatment by strangulation

tubing approximately one inch in diameter, is inserted into the protruding rectum and well up into the bowel After the tube is anchored by sutures a constricting rubber band is placed around the protruding bowel at the normal surface level of the anus and just distal to the external sphincter A spontaneous anastomosis occurs at the level of the band Reid prefers rubber bands to silk ligatures, as the former can be more easily removed if intestinal obstruction develops

Comment While the author has had no experience with this method the literature reveals several reports which are of interest Matas,[93, 94] Reid,[119] Anderson and Borland[4] and Wangensteen[134] have utilized the procedure in one or more cases with gratifying results Eliason and Erb[43] successfully employed it in three instances but they caution against hemorrhage and stricture formation, which occurred in one case Emerson,[44] however, treated seven patients by the elastic ligature and rubber hose method Two patients died following operation, and the remaining five became markedly strictured, which necessitated additional procedures One point probably not sufficiently stressed is the danger of the small intestine prolapsing into the peritoneal pouch and being included in the ligature

SUMMARY

For prolapse in children the injection form of treatment, preferably quinine and urea hydrochloride or phenol in oil, should be employed In procidentia, similar therapy should be given a fair trial, together with the suggestions outlined on page 506 Provided no benefit is obtained by the eighth year, a simple linear cauterization, page 510, or local excision, page 515, may be employed on a trial and error basis A sigmoidopexy may be necessary, however, for satisfactory correction which is certainly not a formidable procedure In adults, mucous prolapse in the aged may respond to the injection treatment, but excision and suture are to be recommended as the procedure of choice For true procidentia the approach is definitely altered Until a few years ago the author attempted various procedures externally and perineally, such as fixation plication and tamponage but invariably recurrence developed It is our belief that rectal and sigmoidal procidentia should be

through the abdomen Our experience has shown that no single operative technic is ideal for all cases rather each patient must be individualized according to the findings at exploration such as the degree of redundancy and length of the mesosigmoid depth of the cul-de sac associated uterine prolapse etc Our choice is a combined procedure (Fig 382 A F) consisting of mobilization of the rectosigmoid and rectum fixation to the psoas fascia shortening of the lateral ligaments by plication with Denonvillier s aponeurosis or its analogue obliteration of the rectovesical or recto uterine pouch and in the female, uterine suspension by a modified Gilliam Baldy Webster technic Where the sigmoid is particularly elongated, an exteriorization procedure with resection and subsequent closure by the extraperitoneal route appears to be sound In poor risk patients especially where an abdominal approach is not deemed feasible avulsion employing David s modification of the Rehn Delorme procedure may be utilized Our results are shown in the accompanying table

TABLE 39 AUTHOR S SERIES OF PROCIDENTIA

OPERATIVE TECHNIC ABDOMINAL APPROACH	NO CASES	OPERATIVE DEATHS	RECURRENCE
Fixation to psoas muscle (Martin) obliteration of peritoneal pouch (Moschcowitz) with or without uterine suspension	1	0	2
Approximation lateral ligaments (Lynch) fixation to psoas muscle (Martin)	4	0	0
Intersigmoidal fossa obliteration (Hirschman) fixation to psoas muscle (Martin)	3	0	1
Approximation of levatores (Graham)	1	0	0
Exteriorization of sigmoid and anastomosis (Bloch Mikulicz)	3	0	0
Mobilization and fixation to pelvic brim (Pemberton)	1	0	0
PERINEAL APPROACH			
Resection and anastomosis (Mikulicz)	4	2	0
Perineal proctosigmoidectomy (Babcock)	1	0	0
Avulsion and plication (David Rehn Delorme)	3	0	0
Total	37	2	3

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